URBAN FUTURE-MAKING

Joachim Thiel, Monika Grubbauer,
Lucas Pohl (eds.)

CONTINGENCIES IN URBAN FUTURE-MAKING

Pitfalls, Potentialities, and Transformative Practices

[transcript]

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Contingencies in Urban Future-Making

Editorial

In the light of existing and looming crises, cities have become crucial sites where desired futures have to be developed, negotiated, and eventually implemented. The book series **Urban Future-Making** addresses the agency of built environment professionals – 'urban future-makers' – in the face of future requirements, present options, and past experiences. The series publishes timely research work related to the interdisciplinary research training group of the same name, jointly organized by the HafenCity University Hamburg, University of Hamburg, and Hamburg University of Technology. The different volumes are of interest for various disciplines linked to the urban built environment, in both the academic and the professional realms.
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1. Introduction to the volume

Monika Grubbauer, Lucas Pohl, and Joachim Thiel

Urban history has regularly produced what geographer Sir Peter Hall (1982) coined as 'great planning disasters'. From the Leaning Tower of Pisa, Eko Atlantic City, and Brasília to the Sidney Opera House, Berlin's BER airport, and Hamburg's Elbphilharmonie and Elbtower – the latter two examples taken from the city where we have assembled this volume – far-reaching interventions into the urban built environment sometimes take a course different from what was originally intended. Some of these interventions end in an incomplete and fragile but enduring state (Pisa, Brasília); some are stopped midway (Eko Atlantic City, Elbtower); some finally fulfil their infrastructural function (Berlin BER); some – after going through heavy turmoil (Sidney Opera House, Elbphilharmonie) – eventually turn into a 'miracle', as Hall (1982: 558) quotes the engineer Ove Arup about Sidney's architectural icon.

Such 'planning disasters' are usually framed as coincidences or accidents. That is, they are considered, first, as exceptional occurrences that, second, stand for processes that have gone wrong and need to be fixed – and that instigate learning in order to plan and manage projects in a more orderly fashion next time. The starting point of this book is to call this interpretation of failed planning and design projects as off-track ventures into question. That things develop differently from what was planned is, we maintain, nothing extraordinary but rather a chronic and normal feature of the built environment as a whole. Failures, the fixing of failures, futile attempts at avoiding failures, and the fact that failures only become evident after time and through use – all happen every day and on different scales, from the large-scale ventures referred to above to interventions into small details of single buildings. And, almost more importantly, the fact that things habitually take a course different from what plans would indicate is not necessarily a disaster that stakeholders responsible for the future urban built environment must avoid or fix. Without advocating for collective irresponsibility, we hold that deviating from the

original course can open up new and potentially promising paths for urban futures.

The concept we mobilize to capture this inherent potential of indeterminacy and uncertainty with regard to urban future-making is *contingency*. Contingency is a multifaceted concept (see Pohl, Grubbauer, and Thiel in this volume). On the one hand, contingency refers to the possibility that things could be different, or, to put it in negative terms, contingency means the impossibility of fixing things definitively. From this perspective, contingency primarily means the opposite of control. On the other hand, contingency can also mean that things are related – for instance, when we say that *A* is contingent upon *B*. Here, contingency stands for the impossibility of viewing things independently of one another, thereby emphasizing their dependency or conditionality. In both cases, however, contingency allows us to centre on the fragile nature of reality – its precarious, uncertain, and dynamic configuration. Focusing on contingency means emphasizing not so much how things are, but how they could be – it highlights that what we treat as 'normal' or even 'natural' could be otherwise, so that there is an inherent potential for change.

This volume sets out to investigate how contingency plays out in the domain of urban future-making. We understand the latter to mean the broad realm of actors and actions that shape urban conditions, including material properties, political institutions, and social dynamics. Urban future-making treats the city, or urban realities more broadly, as constantly unfolding through both temporal and spatial tensions, as well as through path dependencies and urgent demands. Cities are arenas where collective pathways to the future are designed, forecasted, and socially negotiated (see also Dobraszczyk, 2019; Zeiderman and Dawson, 2022). Various urban actors (e.g. from planning, politics, administration, business, and civil society) have the agency to actively shape the city, and yet, we argue, all actions to shape the city are somehow confronted with *contingencies in urban future-making*. With this volume we look into how professional actors with expertise in architecture, engineering, and planning, in their various roles as administrators or experts, address and seek to come to grips with these contingencies.

The contributions to this volume build on the findings of the first volume of our series on urban future-making (Grubbauer et al., 2024a). That volume explored the conflictual dynamics that arise when urban futures are imagined, negotiated, and materialized. We argued that in the light of urgent demands for transformation, the built environment disciplines have a critical role to play in these conflicts. The actions of cities seeking to tackle problems of climate

change and environmental degradation, and to adapt urban spaces to future demands, address a range of built environment domains, from energy to transport, green spaces, and housing. Professionals are thus pressured to take on key roles as agents in transformative processes, being responsible for weighing ecological and social impacts, moderating public debates, and communicating with citizens. The analyses of the first volume showed how these actions unfold within and relate to larger societal arenas of conflicts, and how professionals face the challenge of negotiating conflicts related to 'differing urban imaginaries, layered political frames of reference, and clashing temporalities' (Grubbauer et al., 2024b: 13) in their day-to-day practice. Importantly, we raised the point that many of the conflicts that professionals face seem increasingly emotionalized, arguing that urban future-making thus also represents an affective practice.

While not engaging with the notion of contingency explicitly, the first volume hinted already at contingency as a source of conflict in urban future-making, paradoxically, in a twofold way corresponding to both meanings of contingency addressed above. On the one hand, transformative action in the built environment is confronted with important path dependencies, which include not only material structures and their technical operation but also standardized procedures and institutional routines in the policy realm, as well as habitualized daily practices and cultural norms of citizens. These provide for unexpected, and in many cases much more persistent, structural barriers to transformation than initially foreseen. Thus, contingency is manifested in *conflicts about non-fulfilled promises* of planning and the failures to meet targets and implement projects as projected. On the other hand, transformative action in the built environment necessarily breaks with expectations and established norms: car-centred lifestyles are put in question, alternative sources of energy are envisioned, and the design of open and green spaces follows new paradigms in order to adapt to the new realities of climate change. Currently, much of this is explored in experimental ways, transgressing also the established formats of professional action such as plans, projects, and experiments (see Thiel and Grubbauer in this volume). Here, contingency is a source of *conflicts, as the course of action deviates from established procedures* and leads to surprising and new constellations of actors and interests, as well as to new types of interaction and uses of urban spaces. In both cases, contingency can be seen to play a role as a source of conflicts in terms of expectations that remain unfulfilled and are disappointed.

Coming back to the 'great planning disasters' that provided the entry point to this introduction: Such disasters are usually framed primarily in terms of the first notion of contingency – in terms of the unfulfilled promises and disappointed expectations of policy-makers and citizens alike with regard to time horizons and the burdens that arise from prolonged implementation, or even with regard to the general prospect of a better future (Kemmer and Simone, 2021). Such disappointment weighs even more heavily when unexpected costs are involved and questions arise about whom to hold responsible. But beyond that, the disappointed expectations of citizens, at present, relate fundamentally to the built environment as a constitutive element of everyday life, with streets, bridges, schools, public transport, sports facilities, and other public services all relying on the material and operational qualities of building and infrastructure networks. Recent studies (Heider et al., 2025) show how societal polarization and right-wing extremism are particularly strong where such expectations are left unmet, where public services are in a state of decay, and where the life-world of citizens is crumbling in the truest sense of the word. The city, and its built environment, is thus much more than the material envelope of social life: It is a genuine part of the foundations of democratic societies (Beveridge and Koch, 2022). And yet, interventions into our built fabric are not only to stabilize these foundations or to restore what has been lost; these interventions need to embrace inherent contingencies in both senses of the term. Hence, the refurbishment of infrastructures builds on the path dependencies of legacy systems; at the same time, it crucially requires securing, creating, and leveraging openings that enable the creation of new opportunities and the ability to cope with the demands of an increasingly 'turbulent world' (Amin, 2013).

Against the broader vision of urban future-making, the chapters of this volume ask how contingency can be treated not only as a disturbance to the planning of urban futures but also as a constitutive element of urban future-making; how contingency provides insights into the cracks in dominant systems in order to highlight the moments when certain paradigms and universalized norms are no longer adequate; how certain spaces provide us as urban scholars or practitioners with insights into the contingencies of cities that other spaces don't; how urban temporalities are layered, unfolding in nonlinear ways, thus emerging from entangled pasts and unstable presents; how powerful actors in shaping urban conditions must reconcile with uncertainty rather than suppress it to properly engage with the limits of planning; and how contingency can be mobilized not only as a threat but also as a resource for renegotiating and redefining the city of tomorrow. In other words, this book

aims to investigate the pitfalls, potentialities, and transformative practices that emerge when engaging with the contingencies in urban future-making.

Under the header of 'Conceptualizing Contingency in Urban Future-Making', two theoretical tracks will set the scene. In the first, Lucas Pohl, Monika Grubbauer, and Joachim Thiel probe the overarching concept of this volume: contingency. The chapter departs from the traditional concept of the city as a fixed, orderly whole and instead views it as a contingent formation shaped by uncertainty, competing visions, and the possibility of transformation. It explores how built environments simultaneously sediment existing orders and open new pathways for change, positioning contingency as a vital lens for imagining the city as an always-emergent 'possible otherwise'. Tracing the evolving role of contingency in urban planning, from defensive risk management towards an embrace of uncertainty as a driver of transformation, the chapter examines the delicate balance between control and openness in shaping urban futures. Against the backdrop of overlapping crises, it concludes that built environment professionals face a new condition of simultaneous urgency and uncertainty, in which contingency cannot be reduced to being a threat to be minimized but must be understood as a catalyst for alternative ways of designing, governing, and inhabiting the city. In the second of the conceptual framework chapters, Joachim Thiel and Monika Grubbauer venture into time and temporality as foundational concepts of the broader research on urban future-making. The authors highlight three conceptual contact zones between two timely and prominent, but hitherto largely separate, literatures: one on future and future-making, and the other on time and temporalities. These contact zones are comprised of the open but uncertain future as a feature of late modernity; the enabling but formatting effect of the modern 'socio-temporal order'; and the tricky relation between imagining futures and enacting them now, which is inherent in human agency's embeddedness in the flow of time. From two perspectives, the chapter translates these 'temporal ambiguities' into the urban: On the one hand, it focuses on built environment professionals and the temporalities of formats they use to shape urban futures (plans, projects, experiments), and on the other, it concentrates on the physical dimension of the urban, unpacking the complex temporalities of urban matter. The authors conclude that future-making research and practice essentially implies embracing multiple and ambiguous temporalities as well as complex matters.

The book's first thematic cluster, 'Leveraging History and Opening Futures', brings together four chapters that focus on path dependencies that

historical developments have generated but that impinge on future-making in the present in very different ways. The cluster starts with Thilo van der Haegen's chapter on postcolonial real estate development in Vancouver, British Columbia. The chapter examines large-scale Indigenous real estate development as part of a broader transformation in the city's political economy of land. Using a dialectical lens, it explores how such developments emerge from, yet also actively reshape, settler-colonial structures through the agency of First Nations as urban future-makers. It argues that these projects produce contingent urban futures that are neither fully predetermined nor entirely open, while positioning First Nations as powerful actors capable of redefining the terms of urban development in their traditional territories. Irina Redkina's chapter probes into a very specific phenomenon: industry towns, set up in the mid-20th century, usually adjacent to a huge industrial plant. Those foundational elements were often the emblematic examples of socialist city planning. In this context, Redkina focuses on the case of Bokaro Steel City in India. The chapter offers a thorough account of the origin of Bokaro and gives an important analysis of whether and how those urban structures are able to adapt to today's requirements, which are dominated by a neoliberal imperative. The author argues that the urban structures built during the city's founding exhibit a remarkable robustness, particularly due to the quality of non-commodified public goods that modern planning principles had brought about. In the subsequent chapter, Louis Volont challenges the common view that secular modernity fully replaced religious frameworks with a purely contingent vision of the future, arguing instead that urban future-making continues to draw on forms of sacrality. Through a Durkheimian sociological lens, the chapter examines Hamburg's 2006–2013 international building exhibition as a 'sacred' space of moral boundary-making, suspended norms, and symbolic architectural icons, where contingency was actively staged and celebrated. This reveals striking parallels between the authority of priests, prophets, and planners in shaping which urban futures are imagined, legitimized, and pursued. In the final chapter of this cluster, Carsten Gertz and Katharina Manderscheid approach the role of history in a very specific way: not with regard to the empirical phenomenon they examine – urban air mobility (UAM) – but as an analytical lens. The focus of their chapter is on how new technologies can be implemented in incumbent mobility regimes. For that purpose, Gertz and Manderscheid mobilize historical examples of both successful (the car) and failed (the Transrapid maglev train; urban cabin taxi systems) attempts at such implementation. Building on these analogies

and mapping the field of urban air mobility, the authors conclude that even though many factors seem to contraindicate the successful implementation of UAM, this is not to say that flying taxis will not have a future in the built environment.

The second thematic cluster, titled 'Negotiating Objects and Creating Matter', gathers five chapters that examine the physical aspects of the urban built environment and highlight the contingencies related to urban materialities. Kathrin Meyer investigates the complexities of rooftop extensions on multifamily houses in Hamburg built in the post–World War II period. While the enlargement of existing buildings seems like a suitable plan to alleviate housing shortages and secure resource-friendly construction, the actual implementation of such a plan involves a whole series of contingencies. For instance, the seemingly uniform building types of the 1950s and 1960s prove to be pretty diverse, particularly in regard to their load-bearing capacities. What is more, technical documentation of these buildings is insufficient, so that each expansion project requires extensive case-by-case assessments. Even newly available digital planning tools rely on standardized information and therefore cannot replace a thorough examination of each building. The chapter by Aboli Mangire enquires into the challenges that low-income mass housing strategies in India face due to climate-induced uncertainties. Using a pilot project in Pune as a case study, the chapter shows how standardized reinforced concrete construction and urban design often neglect both the thermal performance of buildings and the daily practices that their residents use to cope with rising temperatures; the result is growing energy demand for space cooling. She calls for socio-spatial methodologies that systematically integrate these lived experiences into future housing design to better address the contingencies posed by climate change. Clara da Ros explores the concept of 'interstitiality' in her chapter, examining the contingent socio-material practices that shape small-scale urban transformation by focusing on the case of a former World War II bomb shelter in Hamburg. Combining interstitial thinking with a practice-theoretical approach, the chapter examines how inherited, in-between urban spaces – often unintended, repurposed, or situated between divergent spatial logics – become active sites where past and future, as well as materialities and social meanings, intersect. Through ethnographic observations of everyday collective activities, the chapter highlights how such interstitial spaces are continually reshaped from within, contributing to urban future-making at the neighbourhood scale. Similarly, Hendrikje Alpermann's chapter examines how urban planners in the German city of Halle-Neustadt navigate the contingent fu-

tures of the vacant 'Hochhausscheiben' high-rises through the lens of 'standby' as a mode of future-making. Drawing on ethnographic research, the chapter shows how planners sustain potentiality amid uncertainty, balancing long-term visions with short-term actions while futures are repeatedly made and unmade. In doing so, the chapter reveals how maintaining buildings 'in play' embodies the tension between stasis and change in post-socialist urban contexts. The cluster on materialities closes with Lena Enne's chapter on the maintenance of gas, water, and sanitation infrastructures in Hamburg. The study centres around the contingencies caused by entanglements between different utility systems. Enne's starting points are two futile attempts at tackling these contingencies by concentrating various utility infrastructures into a commonly accessible supply tunnel; one case is from the late 19th century, and one is recent, within a newly developed neighbourhood on former port land. Building on these examples of failure, the author elaborates on three types of unavoidable contingencies that the examined infrastructures exhibit: spatial contingencies, referring to physical interferences; temporal contingencies, implying different maintenance rhythms; and institutional contingencies, concerning the fragmentation of responsibility.

The third and final cluster, 'Shaping Decision-Making and Advancing Policies', entails four chapters that deal with practices of urban future-making under conditions of contingency, particularly, how cities cope with contingency under different contexts and conditions. Oliver Ibert's conceptual chapter addresses the heart of planning theory. Starting from the classic decision-centred model of planning and the temporal sequence of decision premises and operational decisions characteristic of this model, the author first examines its strengths and limitations. Following that, Ibert discusses the potential of decision-centred planning models to cope with societal disruptions, or 'collectively perceived accelerations of change'. He proposes two options for dealing with disruptions, both concerning the relation between decision premises and operational decisions: One option is to loosen the binding nature of the former for the latter; the other is to reverse their sequence and thereby allow for 'action preceding cognition'. In his chapter, Alexander Stanley addresses strategies that the port cities Hamburg and Cape Town use in order to deal with climate risks. Stanley's work identifies three key sources of the contingencies that port cities chronically face: spatial contiguousness between water and hinterlands; fragmented institutional and regulatory landscapes; and the risk of unexpected climate change–related events. The main body of the chapter – given the author's law background – looks into the regulatory landscape

of the two case study cities. The chapter concludes with an ambivalent statement: that climate adaptation in port cities suffers from institutional fragmentation, yet local professionals have agency and can experiment with the application of new regulatory and planning approaches. Ana Paula Koury and Alessio Mazzaro explore the inherently contingent nature of informal urbanization in São Paulo's peripheries, focusing on the community of Torresmo in Itaim Paulista. Using the case of a post-disaster emergency infrastructure project, their chapter examines how local contingencies intersect with broader structural forces, revealing tensions between municipal–corporate technical cultures and more sustainable urban visions. Through the experience of Lab Itaim, a 'real-world laboratory', the authors reflect on how experimental, participatory methods can engage with uncertainty to negotiate more progressive urban futures in contexts shaped by informality and political complexity. In the final chapter, Gala Nettelbladt investigates the relationship between Berlin and its hinterland, specifically regarding water management dynamics in Lusatia, which holds the capital's supply of freshwater, on the one hand, and the economic future of old coal mining communities, on the other. Drawing from and building upon literature on city-hinterland relations and 'hydrological time', Nettelbladt focuses on understanding the hinterland as an analytical category that is at least partly independent, and whose independence, she argues, is exemplified through specific and contingent temporalities. These temporalities engender a mismatch between Berlin's expectation to be continuously supplied with freshwater, and Lusatia's expectation to have a regional economic future after the end of coal-mining.

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Conceptualizing Contingency in Urban Future-Making

2. Understanding contingencies in urban future-making

Unsettled foundations and the city of emerging possibilities

Lucas Pohl, Monika Grubbauer, and Joachim Thiel

Contingent cities

Cities are often approached as places defined by order and control. They are planned through meticulous urban design, governed by policies and institutions, regulated by laws and ordinances, shaped by infrastructural and technological frameworks, nurtured through communal and economic investments, and built to reflect specific visions of functionality, identity, and progress. Consequently, cities are frequently treated as spaces of power and discipline where each element – be it physical, social, or cultural – is assumed to contribute to a coherent and regulated whole. While this perception undeniably shapes many realities of urban governance, planning, and design, it overshadows a critical counterpoint: The city as a locus of order and control only emerges against the backdrop of a deeper, often unacknowledged, sense of disorder and uncertainty. The geographers Ash Amin and Nigel Thrift state:

> [W]e must see cities as nexuses of systems of discipline – certainly and undeniably. But we must also ensure that we keep a vision of cities with all the uncertainties and risks left in, and especially the recognition that the cities' inhabitants get the chance to redefine, though rarely on their own terms, what it is to be ordered about and interrogated by these systems. The city, in other words, always contains a necessary contingency without which it would be an impossible project. (Amin and Thrift, 2002: 130)

Cities are inherently contingent structures that are always subject to potential change and transformation. The processes that structure the city as a space of order, therefore, presuppose conditions that are inherently contingent and could have unfolded otherwise. Whenever planners, architects, and other kinds of built environment professionals work to maintain or transform the city, they either implicitly or explicitly encounter the city's contingency. Each act of decision-making concerning cities and urban processes, whether large-scale, such as the establishment of transportation networks, or small-scale, such as the placement of a park bench, arises from a complex interplay of competing visions, uncertainties, and improvisations (Zeiderman et al., 2015; Kaker et al., 2020). The constructed order of the city is thus less a fixed reality and more an ongoing negotiation with the ongoing potential for change. Seen in this light, every city could always be different. Even how we define the city is, per se, not unquestionable. Or, as Ignacio Farías (2011: 368) put it: 'The key role of cities is then a historical contingency that could have been and could also become otherwise.'

To widen the scope of what the city is and can be is a crucial aim of urban research, which becomes particularly apparent when we move beyond the familiar contexts of Western European urban conditions to explore other times, places, and conditions. As such, urban research 'allow[s] us to think about the urban as an incomplete and contingent process as well as an undecidable category' (Roy, 2016: 819). Approaching the urban as contingent and undecidable requires both critical analysis and creative speculation. It calls for imagining alternative pathways that challenge prevailing paradigms of urban change, as well as for recognizing its multiple temporalities, where histories of colonialism, migration, and ecological change continue to shape present and future urban conditions. A crucial aim of urban research is not so much to define and determine the city, but to keep it open, as a space of emerging possibilities (Sendra and Sennett, 2022).

In the following chapter, we start by providing a general overview of how contingency has been introduced in different strands of social and political theory. We highlight that contingency is often either considered as a historical or as an ontological condition of society. Based on the latter, we demonstrate how contingency can be viewed as an ongoing and recurring unsettling of once-sedimented social relationships, thereby enabling these relations to change and create space for new possibilities. In the subsequent section, we demonstrate the enmeshed dynamics of sedimentation and social change in relation to urban space and material artefacts. We highlight how the built en-

vironment can influence social processes both by promoting sedimentation, thereby masking contingency, and by fostering social change, thus opening up new pathways for the future. Stemming from this, and drawing on the findings of this volume, we emphasize how built environment professionals cope with contingency and how planning and other forms of urban future-making constantly evolve in response to unexpected occurrences that can be regarded as both threats and opportunities. We conclude by pointing out how contingency offers a new pathway to think of the possible city.

Contingency in and of society

When we try to define the term *contingency*, we should first avoid equating it with coincidence or arbitrariness: 'Contingency is not arbitrary chance. It represents a complex discourse – set of truth-telling practices – about the knowledge of uncertainty' (Dillon, 2007: 45). Contingency does not mean that something is just by chance the way it is or that there is simply no explanation for it. Rather, it denotes a structural inconsistency. In political terms, contingency often carries a dual meaning (Barry, 2016). On the one hand, it refers to the proactive measures taken to prepare for unexpected or extreme events, such as floods, violent conflicts, financial crises, or shortages of essential resources. In this context, practices such as risk assessment, insurance, conflict resolution, and environmental monitoring exemplify the necessity of preparing for contingencies. Organizations are tasked with not only planning for anticipated scenarios but also adapting and formulating new contingency strategies as emerging challenges arise.

On the other hand, contingency suggests more generally that something is not entirely predetermined. In this latter context, contingency implies that phenomena and processes could always be different. In its most radical form, contingency means that nothing is permanently 'fixed' or inherently predetermined. Even when something appears fixed – whether through construction, regulation, materialization, or other forms of stabilization – it remains open to being 'unfixed' at any moment. Contingency, therefore, underscores the inherent possibility of change. There is always potential for transformation, even if the change does not necessarily meet the intended ambitions of achieving stabilization. Being contingent upon something, hence, refers precisely to the likely scenario that this something may 'unfix' one's certainties. This logic also applies to a historical (hindsight) perspective of a former something.

In social theory, contingency has been defined in either historical or ontological terms, i.e. as a particular or universal condition. Sociologist Zygmunt Bauman (1996: 51), for instance, speaks of postmodernity as the particular 'condition of contingency', thereby denoting that contingency signifies a particular moment in social history. After postmodernism abandoned the certainties and principles of modernism, society entered into a condition of contingency in which there are no longer any incontrovertible truths. Society under postmodern conditions, therefore, rests on what philosopher Judith Butler (1992) calls 'contingent foundations', i.e. foundations that always exist in plural and can only be established (temporarily) until, at a certain point, other founding principles are (temporarily) established. Against the notion of a particular condition of contingency derived from 'the postmodern condition' (Lyotard 1984; Dear, 2000), other strands of social and political theory insist that *every* social condition rests on such contingent foundations. A crucial figure in this regard is sociologist Niklas Luhmann (1996), who acknowledges that premodern societies already encountered their own paradoxical foundations, even though contingency found its proliferation in modern (and postmodern) times, when 'all connections' became contingent (ibid.: 64).

Further theoretical contributions gathered under the banner of 'post-foundational political theory' conceptualize the very foundations of politics and society as being based on a necessary and therefore 'radical contingency' (see Marchart, 2007; Landau et al., 2021; Blakey et al., 2022). Political theorist Ernesto Laclau, one of the main contributors to post-foundational political theory, considers the concealed 'contingent nature' of all kinds of social matters and 'institutions' through the notion of *sedimentation*:

> Insofar as an act of institution has been successful, a 'forgetting of the origins' tends to occur; the system of possible alternatives tends to vanish and the traces of the original contingency to fade. In this way, the instituted tends to assume the form of a mere objective presence. This is the moment of sedimentation. […] [S]edimentation can be so complete, the influence of one of the dichotomous relationship's poles so strong, that the contingent nature of that influence, its original dimension of power, do not prove immediately visible. (Laclau, 1990: 34)

Sedimentation – here understood as the routinization, fixation, and objectification of specific constellations of physical, material, and symbolic power – allows us to treat particular social matters as 'normal', 'natural', and thus as in-

evitable, or necessary. The very fact that everything could have been otherwise, on the other hand, implies the absence of absolute necessities, the existence of alternatives, and the ability to reveal and articulate these alternatives as a prime focus of struggles over power and influence. It requires power to stabilize a particular social condition and to maintain the status quo. Conversely, to destabilize a social condition and to open up the space of contingency, power is equally essential. It is here where we find the common ground of contingency and conflict. Whenever political conflicts arise, it becomes clear that things could also be different, i.e. that they are contingent. As sociologist Oliver Marchart (2021: 107) puts it: 'It is through the collision of antagonistic forces that we become aware of the contingent nature of sedimented routines. Only then do we become conscious of the fact that things could be different (historically and in the future)'. If all social processes are inherently contingent, they are inevitably intertwined with possible conflicts over which (contingent) foundation will prevail, and which alternative will be rejected.

As soon as we take contingency in and of society for granted, it is only a small step to engage with the openness of the future. Once we can no longer assume that things will always remain as they are, contingency becomes a central pillar of future-oriented thinking and action. The future is an unpredictable domain filled with risks, riddles, and uncertainties (Amin, 2013; Urry, 2016). To navigate it, strategies are established to aim at controlling and stabilizing potential disruptions (Lentzos and Rose, 2009; Anderson, 2010). These measures are designed to regulate, and 'sediment', the course of change as well as to influence how society unfolds. However, such attempts at stabilization and sedimentation are themselves contingent, often shaped by power asymmetries, ideological assumptions, and the limits of human foresight. In this sense, contingency is just one of many names used to evoke the openness of the future (Anderson, 2010: 780). Rather than a purely destabilizing force, however, contingency offers a generative potential, opening the space for new possibilities, forms of agency, and experimental approaches to imagining and constructing futures that are not merely reactions to risk but also embrace uncertainty as a site of innovation and transformation (Scoones and Stirling, 2020; Grubbauer et al., 2024a).

While there has been a tendency in social theory in recent years to approach society as temporarily or even ontologically contingent, and, respectively, the future as open, we should not neglect that 'we are not in the domain of pure contingency' (Dikeç and Swyngedouw, 2017: 12), i.e. that things do not always change and that there are also necessities (and not only contingencies)

that predetermine the fate of the future: 'As critical scholars wholeheartedly fighting for a better world, we prefer to believe that the world is malleable, that the future is open and up to us, that we are in control' (Simandan, 2010: 388). The truth, however, is that there are various constraints that shape the course of social life, and that critical knowledge often does not change the way things are. The future is thus not always open (particularly not to everyone), but to some extent, it is more often predetermined by powerful actors and sedimented structures. And something similar is true of the city, as 'urban spaces and institutions are most of the time "settled", in sedimentation after a certain contingent, disputedly instituted "setting" has been successful and met with acceptance' (Heindl, 2023: 221). Yet, what contingency allows us to highlight is a certain 'degree of undecidability' (Landau-Donnelly and Pohl, 2023: 488) that lurks within every form of social (inter)action. Contingency, therefore, means to 'furnish an always expansive space of possibility, not in the sense that "everything goes", but by eliminating the possibility of a final suture' (Fisker, 2021: 68).

Whether we understand contingency as a particular or as an ontological condition of society, the concept can help us to insist on the perpetual possibility of change. Recognizing the contingent nature of the things around us thus leads to a kind of denaturalization and de-objectivation of our social environments. Contingency sets society in motion. Of course, this does not mean that things are actually changing. On the contrary, we are currently experiencing a contradictory political situation in which everything seems to point to necessary change, yet nothing seems to be fundamentally changing. As put by Geographer Erik Swyngedouw:

> While clouded in rhetoric of the need for radical change […], a range of technical, social, managerial, physical, and other measures have to be taken to make sure that things remain the same, that nothing really changes, that life (or at least our lives) can go on as before. (Swyngedouw 2018: 82)

Yet, even in times of stasis and supposedly 'complete' sedimentation, contingency can emerge at any time to unsettle the status quo – no matter whether it is on a micro-scale of social interaction or on a macro-scale of societal transformation. That is what this volume is about.

Contingent urban foundations

The dynamics of sedimentation versus social change become more complex when the interrelation between urban space and material artefacts is considered. The interaction of social processes with material structures has long occupied the attention of research in different disciplines concerned with cities and spatial formations in general, from the social sciences and the humanities to the built environment disciplines of architecture and planning, among others. Socio-materiality is certainly a key theme and common denominator of the interdisciplinary field of urban research (Guggenheim, 2016; Watson, 2019). The interaction and interrelation between social and material worlds is, first of all, shaped by different temporalities: On the most fundamental level, different temporalities stem from differences in the substance of human and non-human life, as the life span of material matter is in contrast to the lifetime of humans; however, societal processes and social change are themselves also structured by different temporal cycles. Beyond the life expectancy of humans, the temporal regimes of modern societies, including their political cycles, play a role, as do the temporalities and rhythms of social practices and everyday urban life (Madanipour, 2017; Wunderlich, 2023). Yet, material matter, particularly in the form of the built environment, is constantly subject to human intervention: decisions influencing the lifespan and continued existence of built objects based on economic, cultural, and political rationales (see Thiel and Grubbauer in this volume).

When socio-materiality is seen as a constitutive feature of urban life, contingency can be recognized as the result of the unpredictable ways in which built structures and urban form can influence social processes in both directions: towards sedimentation or towards change. The built environment contributes to and exacerbates processes of sedimentation. Built structures and urban form thereby function as forces of inertia by objectifying the structures of the social world, and by serving as a locus of collective memory, place identity, and symbolic meaning (Steets, 2015). At the same time, urban spaces and built objects can provide for inspiration and collective imagination that point to new pathways for the future (e.g. Dobraszczyk, 2019; Zeiderman and Dawson, 2022), they can support societal progress in very fundamental material and operational terms, and they can trigger social change by prefiguring other social worlds and allowing for social experimentation (e.g. Vasudevan, 2017; Graeber and Wengrow, 2021). A crucial task, then, for 'urbanists' of all sorts is to ask: 'how to plan the construction of the next layers in the urban palimpsest

in ways that match future wants and needs without doing too much violence to all that has gone before' (Harvey, 1996: 49–50).

Processes of *sedimentation* in terms of the fixation, normalization, and objectification of social constellations become manifested in and through urban spaces on different scales: from settlement patterns and technological infrastructures to urban typologies and individual buildings as artefacts of everyday life (Sennett, 1991; Markus, 1993). Trying to understand how these elements as products of decision-making and human action at some point in history shape societies in the long-run and across generations, researchers have proposed a variety of concepts: Historians and cultural theorists have conceptualized the city as a 'palimpsest', constituted by accumulated layers of meaning, memory, and cultural symbolism (Huyssen, 2003; Binder, 2015). Architectural and urban theorists, in particular, have drawn attention to the ways in which everyday use and appropriation of space by inhabitants are part of such processes of meaning-making over generations (Cupers, 2013). Paying attention primarily to technological, economic, and ecological factors, the concept of path dependency is used by historians and other scholars to explain why certain trajectories and spatial constellations become stabilized while other paths are not taken (e.g. Bernhardt, 2018), with recent interest particularly in the temporal dimensions (Engels, 2020). With a focus on sedimented processes of socio-spatial fragmentation, exclusion, and marginalization, urban scholars have long sought to systematize how the social stratification of society and spatial structures interact and re-enforce themselves over time, showing how patterns of socio-spatial disparity are often extremely persistent and difficult to change (Graham and Marvin, 2001).

How *exactly* the interaction between social processes and material artefacts impacts sedimentation has been up for debate for a long time: One of the key challenges for various built environment professionals is to understand and anticipate how built structures impact human societies far beyond the specific political, cultural, and economic context of their origin. Academic debates offer different ways to conceptualize this impact of built structures: Cultural concepts such as *Erinnerungsräume* (spaces of remembrance) pay attention to the accumulated memories of generations that become symbolically manifested in specific places (Assmann, 1999). Sociologist Richard Sennett (1970) highlights how the symbolic power and authority of dominant groups influences the meaning of buildings and urban spaces. Geographer David Harvey (1985), on the other hand, addresses the economic dimension of sedimenta-

tion by pointing out how capital accumulation impacts the built environment through the logics of rent-seeking and spatial fixity.

Two contributions in this volume examine the crucial role of the built environment via an historical analysis that allows us to trace processes of sedimentation as a result of the interaction between social processes, built structures, and political contexts. Both highlight the unexpected ways in which contemporary social dynamics emerge from historical contingencies. Thilo van der Haegen, in his chapter on Indigenous real estate development in Vancouver, analyses how contingency can be understood not in the sense of 'everything goes', but as a way to engage with the indeterminate and often contradictory nature of urban futures. Using the example of First Nations housing projects, he shows how their integration into the real estate market reflects both practices of 'doing otherwise' and the reproduction of settler-colonial accumulation through the expansion of private property onto Indigenous lands. He concludes that the contingent character of urban future-making in postcolonial cities like Vancouver emerges from the dynamic interplay between lingering settler-colonial structures and present-day Indigenous agency. Irina Redkina, in her account of the legacies of modernist planning in India, also makes a claim for conceiving urban future-making as contingent upon historical structures, as seen in her analysis of the steel town of Bokaro. In her argument, contingencies emerge from the interplay between historical public spaces and the changing social and economic context surrounding them. She highlights how today these spaces, also due to their remarkably robust design, serve social life in the city in unexpected ways by allowing for non-commercialized social interactions amid market-driven urban development.

Processes of *social change*, on the other hand, are equally manifested in and fuelled by urban transformations and material interventions in the built environment. Most obviously, this relates to large-scale endeavours of urban and regional planning: The (re)building of cities in the modern era has long been understood as a sign of progress and as a radical break with the past (Kaika and Swyngedouw, 2000; Gandy, 2004). Post-independence capital cities, large-scale infrastructural projects, modernist housing estates, and iconic signature buildings all stood as turning points and promises of societal changes, and all had the political function of legitimizing new political regimes and establishing new societal compromises, whether in the Global West or the Global East. The dilemma of the present situation is that many of these promises of (European) modernity have lost their ideological appeal (Reckwitz, 2021). This resulting uncertainty is felt drastically under conditions of urban crisis, where

the built environment no longer provides comfort and amenities in the ways it is expected to. Indeed, social change in the present moment is fuelled by a loss of trust in the operations of state institutions; this becomes manifested, most clearly, where infrastructures fail, housing is in short supply, and basic services are interrupted (Grubbauer et al., 2024b).

Two other contributions in this volume, which investigate urban conditions in the Global South, provide an important corrective to simplistic assumptions about ideas of progress and social change associated with modernist and top-down planning. Ana Paula Koury and Alessio Mazzaro's chapter raises the question: What happens if state institutions have never managed to build trust with large parts of society, so that a lack of trust in the state is not an unusual or new phenomenon but is, instead, a common one? In their discussion of water infrastructure development in São Paulo's peripheries, the authors show how 'contingencies are the rule and not the exception'. Along a range of emergency interventions in the face of severe flooding, they illustrate how unforeseeable events, but also established governance routines, lead to unsustainable and unsatisfying outcomes in informal settlements. Similarly, the chapter by Aboli Mangire deconstructs modernist narratives around mass housing for the poor amongst climate change uncertainties in India. She shows how government policies that provide mass-produced housing under the banner of poverty alleviation appear inadequate when viewed in the light of future climate necessities. The policies prioritize standardization in construction using reinforced concrete frames, yet, as Mangire shows in her case study, such construction techniques neglect the thermal evaluation of materials and the cooling requirements that will only increase in the future.

Another long-standing strand of the discussion about how urban spaces have the potential to trigger and amplify social change looks at the more informal ways in which urban spaces are used and appropriated on a smaller scale. Scholars of different disciplines have theorized cities as places of encounter, arguing that social interaction is fundamental for understanding cities as sites of innovation (Jacobs, 1969), but also as sites of democratic practice and political contestation (Holston, 2008; Harvey, 2012). This goes along with the argument that cities have, historically as well as in the present, served as nodes in global networks of communication (Sassen, 1991; Graeber and Wengrow, 2021). A relevant but sometimes overlooked argument is that not only spatial proximity and social heterogeneity but also spatial and atmospheric qualities contribute to social interaction and the emergence of new ideas. This is a rich thread in architectural and cultural theory, concerned with understanding how urban

spaces are used in expected but also unexpected ways, as well as with which types of urban spaces have the greatest potentials for new and diverse uses (Borden et al., 2002; McGuirk, 2014). While modernity was radical in experimenting with new building typologies, forming new urban practices, today's potentialities (not only in Western contexts) are often seen in spaces of 'in-betweenness' that escape institutionalized order: niches, informal and derelict spaces, wastelands, and even ruins (Gandy, 2016; McFarlane, 2021).

In her chapter, Clara Da Ros engages with 'interstitial' spaces as a gateway to reflect on the contingency of urban life. In her research on bunkers in Hamburg, she addresses the transformation of bunkers from their original military purposes to becoming spaces for collective cooking, urban gardening, and storage rooms for agricultural goods. Through this, Da Ros argues for an 'always-in-the-making' of urban space. The key point here is that the potential of urban spaces to either reinforce sedimentation or to support the emergence of new social practices ultimately remains unpredictable. Contingency lies not only in the fact that the 'normality' of social reality can always be questioned but also in the fact that these questionings already unfold within built structures. Built environments are *immanently* unstable, as they emerge from human actions, are subject to culturally specific forms of human appropriation, interpretation, and valuation, and are shaped by non-human activity as well as ecological processes of aging and decay.

Coping with contingencies in urban future-making

Today, we can see how buildings and infrastructures increasingly face extreme conditions for which they are not adequately designed, and we see that existing built environments have to be radically adapted to new ends and functions in order to save energy and other resources. Incorporating redundancy and resilience into cities' hardware becomes essential to navigate urban futures under unpredictable conditions. However, in the face of the longevity of built structures, decisions made today to adapt to an uncertain future will have lasting effects over generations, especially when considering large-scale infrastructural works. Coping with an indeterminate future and unforeseen extreme events thus requires rendering both the existing urban fabric and new constructions resilient and adaptable to future needs. Also, the relation between sedimentation and change requires being addressed in new ways, in particular when the maintenance and stabilization of existing structures is at stake.

Whether the practices and tools of policy and planning are equipped for such a task is discussed in this section.

In terms of how professional practice generally mobilizes the notion of contingency, we can attribute Barry's (2016: 2) first part of the 'dual meaning' of contingency mentioned above. Following that logic, contingency does not denote that everything could be different, but mostly 'refers to those things that should be done in advance in order that unexpected and (sometimes) extreme events can be managed'. The key notion in such applied understandings of contingency is 'contingency planning' (e.g. Clay, 1971). There is a long tradition of contingency planning in military services, risk-exposed government departments (e.g. administration of critical infrastructures), and corporate strategies, wherein management literature often distinguishes between 'defensive' and 'offensive contingency planning' (ibid.: 71). In this vein, and from a business perspective, unexpected occurrences can thus be regarded as both a threat (defensive) and an opportunity (offensive). Both options, though, require a sense of preparedness to be able to either seize the opportunity or to avert the threat (or, at least, mitigate its hazardous impact).

Within management research, the literature on 'high-reliability organizations' (HROs) (Weick, 1987; Weick et al., 2008) discusses the most extreme needs for, and therefore most sophisticated modes of, such preparedness, though these focus on the 'defensive' side of contingency planning. HROs include systems such as air traffic control or nuclear power plants. These systems are technically complex, hence harbouring the risk of small incidents cascading into major disasters; the impact of disruptions to these systems would in fact be so disastrous that conventional incremental modes of trial-and-error learning are not at all an option. Transferring the lessons from HRO research to mega-project planning, Gernot Grabher and Joachim Thiel (2014) conclude that systems, in order to maintain their adaptability to shocks, need to create 'redundancies' (see also Grabher, 1994), which can be structural, relational, or cognitive (Grabher and Thiel, 2014). Structural redundancies include the allocation of extra resources (time, space, money, organizational structures) to the system that are not used in normal times but can be easily mobilized when necessary. Relational redundancies comprise informal networks able to take over when formal hierarchies collapse or prove unable to make decisions quickly enough. Cognitive redundancies refer to the attitude of involved organizations, requiring a collective sense of preparedness and 'mindfulness' (Weick et al., 2008) that helps to 'uncover assumptions people take for granted, trace out new implications of old assumptions, and identify

latent organizational flaws' (ibid.: 54). The cognitive dimension of preparedness, then, supports the 'acceptance that things can go wrong' (Grabher and Thiel, 2014: 542), so that involved stakeholders need to anticipate failures even if everything is in order.

Also in urban planning research, extant literature has long focused primarily on the 'defensive' side of contingencies: Contingency plans are designed to afford preparedness for any kind of high-impact event, such as transport interruptions, flooding, drought, or earthquakes (e.g. Meyer and Belobaba, 1982; Torrieri et al., 2002). The key for those plans is to provide decision-making support for 'as if' constellations (Anderson, 2010: 787). This support basically involves two elements: simulation and scenario planning tools to anticipate possible situations that require immediate response (e.g. Chakraborty et al., 2011; Othman et al., 2023), and a protocol that assigns roles and defines responses as if the anticipated situation had occurred (Meyer and Belobaba, 1982). However, research also emphasizes the politicized but contradictory nature of contingency planning. On the one hand, the (un)effectiveness of a plan in crisis situations 'is readily associated with the city leaders who adopt it' (ibid.: 462). On the other, it is difficult to motivate political leaders to engage in contingency planning 'when there is no crisis' (ibid.: 464). Adding to that, Kerstin Eriksson and Allan McConnell (2011) argue that given the importance of 'non-contingency planning factors' for the quality of 'crisis management outcomes', the correlation between the planned and the actual outcomes is anything but straightforward.

Several contributions to this volume illustrate how such traditional approaches of contingency planning appear outdated in the present context. Alexander Stanley explores the contingencies that result from these new risks for port cities in particular and shows how traditional concepts of risk assessment in port planning are limited by their focus on material infrastructure. Drawing on the two cases of Hamburg and Cape Town, he proposes to think of law-making as a dynamic process and argues that climate adaptation planning needs to be more flexible by constantly adapting to law and governance arrangements. Similarly, the chapter by Lena Enne, with her investigation of infrastructural work in Hamburg, points to the limits of traditional contingency planning. She highlights how contingency results particularly from the interrelations between different infrastructure sectors, and from the evolving standards and procedures in maintenance, adaptation, and expansion of overlapping utility grids since the 19th century. Administrators and experts dealing with these kinds of urban networks in the current context need to take these

contingencies into account when coordinating infrastructural maintenance and repair across the different sectors, with different material needs, varying organizational and ownership structures, and dynamically shifting political priorities.

More recently, though, planning literature has begun to use the term *contingency* in a different manner, as a general attitude for coping with uncertain futures. Contingency is regarded as the opposite of control, as, for instance, the literature on 'urban living labs' (Bulkeley et al., 2019) maintains. Thus, approaches to contingency planning, in this more recent sense, in a way, imply a return to incrementalism; such approaches are 'inspired less by cohesive, long-term visions of twentieth-century urban planners and more by locally focused interventions that are transforming cities through incremental processes' (Karvonen and Bylund, 2023b: 153). This attitude both adopts the second part of Barry's (2016) dual meaning of contingency – namely, 'something that is not entirely predetermined' (ibid.: 2) – and stresses the 'offensive' side in Michael J. Clay's (1971) model of corporate contingency planning. Hence, this idea of contingency in planning is about openings and opportunities. Experimental approaches – epitomized in the proliferation of urban laboratories (Karvonen and van Heur, 2014) and other more 'acupunctural' interventions into the urban fabric (Lerner, 2014) – open up opportunities, and a strategy of incrementally 'muddling through' (Lindblom, 1959) enables planning professionals to leverage these openings.

Urban scholars today look into the increasingly piecemeal involvement in the 'blessed mess' (Karvonen and Bylund, 2023a) of urban development from different directions: Some link these approaches to 'tactical urbanism' (Vallance and Edwards, 2021), others to the idea of 'agonistic planning' (Pløger, 2023); others discover 'a city of permanent experiments' (Karvonen, 2018) as the main feature. The chapter by Kathrin Meyer in this volume reminds us that also incremental and acupunctural material interventions into the existing building stock face important contingencies. Discussing the case of rooftop extensions, which are considered a promising strategy of densification in combination with energy-efficiency measures in response to social and ecological demands, Meyer shows how uncertainty results from the lack of reliable building documentation. In this way, contingency emerges not only from future unpredictability but also from fragmented knowledge of the past and the material characteristics of existing structures.

However, the growing embrace of contingency in urban planning is not without critique. Some scholars warn that promoting a positive or 'offensive'

stance towards contingency risks abandoning the planner's role in steering urban development (Savini, 2017; Kaminer, 2024) and ultimately aligns with the logic of neoliberalism. As Tahl Kaminer (2024: 14) puts it, '[i]nevitably, "embracing contingency" […] means subjugation […] to the free market'. The advocates of such an embrace admit the risk of losing control but rather call for the right balance between 'control and contingency' (Bulkeley et al., 2019: 319) or emphasize the importance of evaluating and reflecting on the impact of small-scale interventions to enhance their transformational capacity (Karvonen and Bylund, 2023a).

The chapters in this volume show how the concept of contingency can enhance our understanding of planning processes beyond the above dualistic juxtaposition of radical openness or the loss of control. In his chapter, Oliver Ibert revisits decision-centred planning models in light of today's uncertainty. Emphasizing planners' role in shaping future expectations, he builds on Faludi's (1985) distinction between 'operational decisions' and 'decision premises' to outline two strategies: One prioritizes flexible short-term responses while maintaining long-term premises; the other focuses on achieving immediate goals while keeping long-term expectations open. Similarly, the chapter by Hendrikje Alpermann, with her proposition to think of future-making in a mode of 'standby', problematizes the schematic temporal sequence and strict connection between decision premises and operational decisions in planning. In her reading, modes of standby are characterized by 'a readiness to act when conditions are right, requiring a constant investment of energy and attention despite uncertain outcomes', a mode of operation in which the focus is switching between short-term measures and long-term goals in a constant state of indeterminacy.

Apart from the different ways in which planners address contingency as a factor that shapes the way they plan, planning theorists such as Patsy Healey (2012) and Jean Hillier (2017) argue in favour of a structural, if not ontological, role of contingency in planning. Planning, in their vision, is 'replete with the radical contingency of emergent possibilities' (Hillier, 2017: 347) and, as such, follows 'a contingently universal stream of ideas, evolving with our contingencies and innovative energies […]. Our ideas about planning and its value for the contemporary world are kept alive by continual review, reassertion and reinterpretation, as we rework them in the flow of human activity' (Healey, 2012: 201). Taking this seriously means that planners and other built environment professionals constantly cope with contingencies, whether they are aware of them or not. To quote political theorist Chantal Mouffe (2005: 18), 'every order

is the temporary and precarious articulation of contingent practices', and urban planning and other kinds of urban future-making are no exception. There are no 'master plans' that are not undermined by a certain lack of certainty, predictability, and mastery – no frameworks, rationalities, and imaginaries without an inherent openness towards uncertainties and alternatives – no planning without unplannabilities – no future cities without other possible cities.

Rethinking the possible city

Against the backdrop of the growing challenges arising from the numerous and overlapping crises of our time – ranging from the financial crisis, migration crisis, Covid-19 crisis, climate crisis, health crisis, and energy crisis to geopolitical crises, the crisis of democracy, and the planetary crisis – the futures of cities are becoming increasingly uncertain (Coaffee and Lee, 2016; Shatkin, 2019; Bovo and Galimberti, 2021). These interlocked crisis developments, also framed as 'polycrisis' (Lawrence, 2024; Hilbrandt and Ren, 2025), expose the fragility of urban systems and reveal the extent to which urban life is shaped by unpredictability. The dramatic and progressing disappearance of 'habitability' under climate change (Hentschel and Krasmann, 2024; Pohl, 2025), along with the pressure on democratic institutions and socio-economic well-being, seems to bring about an increasingly grim and uncertain future (Chakkalakal and Ren, 2022; Fligstein, 2025). In light of climate change, in particular, the assumptions around the functioning, aging, and meaning of architecture, urban spaces, and infrastructural systems are radically questioned (Dawson, 2017; Goh, 2021). With ecological interdependencies, extreme weather, and environmental catastrophes becoming part of everyday urban conditions, it has become increasingly difficult to predict the demands and needs that built structures will have to meet for future generations. Against this background, the contingency of the urban once again becomes apparent, in that what we usually consider to be 'normal' or 'natural' components of cities – such as stable infrastructures, economic prosperity, public services, or even democratic governance – can no longer be taken for granted.

Against that background, built environment professionals find themselves in a highly demanding and, as we argue, new situation: Usually, with regard to urban development, the expectation is that urgency reduces uncertainty as time pressure forces priorities to be clarified and action to be taken (Grabher and Thiel, 2015). This is not the case at present, and this double condition, of

urgency and uncertainty, poses a particular challenge for professionals in the field of the built environment. They have to make decisions and implement solutions that are expected to take immediate effect, yet at the same time, decision-making processes and implementation are increasingly complex and drawn out (Wiechmann, 2016; Raco et al., 2018), as professional expertise allows assessment of the key role the building and transport sectors play in contributing to carbon emissions, as well as an understanding of the complexities involved in architectural, engineering, and planning projects in the context of social and ecological transformation. In their roles as administrators and experts, built environment professionals find themselves at the forefront of many ecological and social challenges discussed in the chapters of this volume. Yet, at the same time, they must negotiate fundamental uncertainties, as established criteria and modes of calculating risks, costs, and benefits based on life cycles in the built environment are under revision. Gertz and Manderscheid, in their discussion of this difficulty of predicting future demands and needs, use urban air mobility as an exemplary case. Drawing on historical instances of successful and unsuccessful attempts at introducing technology-induced changes in transport systems, the authors stress the non-linear trajectories of systemic transformation. Even though current models of implementing urban air mobility are failing, this is not to say that the technology will eventually be adopted in one way or another.

The city has the inherent potential to become what political theorist Margaret Kohn calls a 'radical space' that constitutes a 'site of dislocation, rupture, contradiction and contingency' (Kohn, 2003: 22), where established spatial forms and practices are constantly being reconfigured. While a strategic disruption of regulated pathways can also be part of a certain 'sacralization' of the city – as Louis Volont's chapter demonstrates in his analysis of the International Building Exhibition (IBA) Hamburg – an emphasis on the contingent foundations of the city allows us to highlight the more subtle openings and possibilities that appear outside the control of powerful actors. This volume aims to shed light on the key role of built environment professionals and their fields of action and expertise in developing such openings and possibilities. Under urban conditions in which virtually every attempt aimed at transforming the city inevitably feeds back into the sedimentation of existing urban power relations (for example, when the conversion of a street into a bicycle lane simultaneously contributes to the gentrification of the surrounding neighbourhood), it becomes increasingly difficult to discern the possibilities

for genuine change. And yet it remains the task of the 'urbanist' to uphold the possibility of change, even when it seems impossible.

Here, the current condition of heightened uncertainty might present an opportunity: to rethink the urban in entirely new ways, to experiment with new modes of urban praxis, and to envision alternative ways of planning, designing, building, governing, and living in cities. Contingencies in urban future-making allow us to focus on 'experimental intervention in a world that exceeds human powers of attunement, explanation, prediction, mastery, or control' (Connolly, 2011: 10). In a time when reactionary political forces are gaining control and transformative change is met with ever more denial and resistance, it is probably more crucial than ever to keep the city open. In a time when urban professionals are confronted with the undermining of their efforts and work, as plans are put on hold, regulatory measures are repealed, and material interventions are dismantled, it is up to urban researchers to insist on contingency as a crucial part of urban life. In a time when '[t]he system of possible alternatives tends to vanish and the traces of the original contingency to fade' (Laclau, 1990: 34), we are encouraged to hold on to the city's contingent foundations as the space for new possibilities in the future.

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3. Understanding temporalities in urban future-making

Embracing temporal mess and handling urban matter

Joachim Thiel and Monika Grubbauer

Introduction

It is commonplace that future-making is about time. Surprisingly, though, it seems that extant literature does not reflect this obvious conjunction in an adequate fashion. There is, on the one hand, a diverse and rapidly expanding body of work that addresses the future as well as the ways in which it is tackled. *Future*, *future-making*, and *futuring*, as subjects of conceptual reasoning and empirical research, are in vogue, most clearly in the growing field of 'transition studies' (e.g. Haugland, 2023; Ertelt and Hawxwell, 2025), but also in (economic) sociology (Beckert, 2016; Esposito, 2024), environmental policy research (Hajer and Versteeg, 2019; Oomen et al., 2022), and most recently also in management and organization studies (e.g. Wenzel et al., 2020; Comi et al., 2025). In this extensive body of work, time is obviously tackled in one way or another; however, 'an explicit discussion of temporal aspects is often quite limited', as Haugland (2023) maintains with regard to transition studies.

On the other hand, also time and temporality are experiencing a recent rediscovery in several parts of the social sciences. Whereas a 'sociology of time' had already gained traction by the 1980s with the work of Norbert Elias (1984), Anthony Giddens (1984), Eviatar Zerubavel (1985), and Helga Nowotny (1992), among others, recently, more applied disciplines such as (again) management and organization (Hernes, 2022; Blagoev et al., 2024), but also planning (Beauregard, 2015; Laurian and Inch, 2019; Abram, 2020; Dobson and Parker, 2025), have explicitly sought to integrate time and temporality into their conceptual apparatus. The future does appear in the extant work on temporality as the open-ended element within the complex entanglements between

past, present, and future. An explicit conceptualization of the future and, in particular, of future-making, remains yet to be done.

Our intention with this chapter is to help close the gap between the rich work on future-making, on one side, and time and temporality, on the other, and to relate our insights into this conjunction to the urban. This undertaking goes in several steps: We begin with three points of departure that we consider as conceptual contact zones between the two literatures. The first of these starts with the *future*, and with how the future has become and changed as a relevant temporal category; the second revolves around *time*, and the ways in which temporal structures have become reified and shape social life, but can, however, also be purposefully shaped; finally, the third starting point focuses on *making*, or on the temporalities that are inherent in social agency (Emirbayer and Mische, 1998). Next, we try to translate the result of this conceptual orientation onto our idea of urban future-making. We do this from two contrasting perspectives that, in our view, echo the two sides of professional practice in the urban built environment. That is to say, we look into the *subject* of urban future-making: the built environment professionals and their agency. More specifically, we probe into the three classic formats of professionally embracing the future. Following to that, we focus on the *target* of urban future-making, the urban spaces that built environment professionals address in their architectural, engineering, and planning activities. Here, our attention is specifically on the role of the materiality of the urban built environment. Urban matter, on one side, constitutes the object of professional agency. On the other, the built environment has its own temporalities that shape this agency.

Our argument is that the analysis of time and temporalities in urban future-making – from whatever perspective we start – reveals critical challenges: ambiguities, tensions, knowledge limitations. Urban future-makers, it seems, chronically run the risk of getting lost in what we suggest to call a temporal mess. They cannot control multiple temporalities with the tools they are trained to work with, and they lack the ability to fully oversee and anticipate the dynamics of urban matter. And yet, we consider essential for built environment professionals (and also for built environment researchers) to proactively and productively embrace time – as category that we need to understand if we seek to come to terms with urban future-making; but also as source and driver of agency that urban future-makers can leverage and purposefully shape in their professional practice. But we will now move on to the conceptual realm.

Time and future-making: Conceptual contact zones

Let us begin with the first point of departure – *future*: There is a general consensus that future and, even more, future-making are essentially modern concepts. 'Detraditionalization' (Beckert, 2016, among many others) changed the 'temporal dispositions' of societies; no longer does the cyclical reproduction of the past or the expectation of a sacred hereafter determine our understanding of the time to come. The future turned from something to be fulfilled into 'a contingent construct' (see Volont in this volume), that is, into an essentially malleable path ahead, or, in a nutshell, 'future matters' (Adam and Groves, 2007). At the same time, an open future is essentially uncertain, and the greater the variety of possible 'future presents' (Esposito, 2024), the greater the uncertainty. Matthias Wenzel, Hannes Krämer, Jochen Koch, and Andreas Reckwitz (2020) maintain that the uncertain side of future-making has become evident only quite recently, from about the 1980s onwards. Particularly in large parts of the 20th century – a period that the authors call 'organized modernity' (ibid.: 1446) – organized planning practices and the assumption of persistent progress conveyed at least the idea of a controllable future and therefore helped 'de-problematize' (ibid.: 1444) the time to come.

As to the second starting point, modernity and modernization, besides opening up the future, have also fundamentally transformed the role of *time* in society. Most obviously, this transformation has implied what Zerubavel (1985: 2; emphasis in original) refers to as a '*socio-temporal order*, which regulates the structure and dynamics of social life'. This order builds on 'temporal regularities' (ibid.: 1) – or 'hidden rhythms', as the author has titled his seminal book. Zerubavel explains these rhythms in terms of the different temporal 'dimensions of […] any situation or event' (ibid.): *sequence; duration*; *timing* (i.e. 'temporal location'; and the rate of *recurrence*. The rise of temporal regularities was based on the introduction of two powerful time-related devices: the *calendar* and the *clock*. Whereas the first primarily allowed for the regulation of 'the temporal location of […] collective events' (ibid.: 31), the mechanical clock standardized both the duration and the determination of actual points in time.

One cannot, however, regard the socio-temporal order as fully unalterable. In principle, temporal sequences, rhythms, durations, and timings are malleable, provided that the 'members of the broader community accept and enact the newly mandated structures' (Orlikowski and Yates, 2002). What is more, measurable time can be framed as a (limited) resource that one needs to 'opti-

mally' deploy (Zerubavel, 1985: 57). In this vein, Orlikowski and Yates introduce the notion of 'temporal structuring' (2002: 684). Time, then, not only shapes behaviour but can itself be purposefully mobilized and manipulated: '[P]eople […] can also choose (whether explicitly or implicitly) to (re)shape those temporal structures to accomplish their situated and dynamic end' (ibid.: 688).

When it comes to the future and to future-making, the socio-temporal order has contradictory implications. In a way, it renders the future predictable – at least to a certain degree, and along with other institutional elements (Adam and Groves, 2007: 8); temporal regularities engender expectations and enable scheduling and planning beyond the present moment. They afford, thus, a '*temporal anchoring of normalcy*' (Zerubavel, 1985: 20, emphasis in original) – or 'temporal landscapes' (Tavory and Eliasoph, 2013: 909) – that can be extrapolated into the future. That a university programme lasts 5 to 6 years, for instance, makes the calculation of parents' financial support possible. That municipal assemblies are re-elected every 4 to 5 years requires and allows for the alignment of plans and projects with these cycles. Deviations from normalcy – temporal irregularities – irritate, as they frustrate expectations or cause 'cognitive incongruity between social figures and temporal grounds' (Zerubavel, 1985: 22). However, deviating from extrapolated normalcy can also occur as an act of temporal structuring or – in other words – of purposeful future-making.

The third and last conceptual starting point, then, addresses more explicitly the *making* in future-making. More specifically, it relates to 'agency' and the way Mustafa Emirbayer and Ann Mische (1998) view 'agency' as 'temporally embedded', that is,

> as composed of variable and changing orientations within the flow of time. Only then will it be clear how the structural environments of action are both dynamically sustained by and also altered through human agency – by actors capable of formulating projects for the future and realizing them, even if only in small part, and with unforeseen outcomes, in the present. (ibid.: 964)

In the authors' words, those 'variable and changing orientations' form a 'chordal triad' of 'constitutive elements […]: iteration, projectivity, and practical evaluation' (ibid.: 970), corresponding broadly to different temporal orientations – the past, the future, and the present, respectively. For obvious reasons, our interest here is mainly on the future orientations, i.e. the element

of projectivity, as 'the imaginative generation […] of possible future trajectories of action' (ibid.).

What is important for our focus on urban future-making? The three elements of the 'chordal triad' interrelate and overlap. Projectivity, hence, implies different ways of reconnecting past experience and present needs with narratives of possibly alternative futures. What is more, projectivity itself exhibits its own internal 'chordal structure' (ibid., 988). As a consequence, it can oscillate between narrative imaginations and practical ('experimental') enactments – or, in short, be oriented more to the 'future' or more to 'making'.

Probing the agency of urban administrators in European cities, Barbara Czarniawska (2004) connects Emirbayer and Mische's chordal triad of past, present, and future with the different time perceptions of *chronos* (clock-time) and *kairos* (event-time): 'Chronology organizes the present (extended to the immediate future). The past and the distant future are governed by kairotic time' (ibid.: 776). Hence, for those professional urban future-makers Czarniawska refers to, the closer their perspective onto the future is to the present, the more it is dominated by the clock and the rigid temporal structures that both shape and help organize our collective life. Conversely, the greater the distance to the present, the more addressing the future is about its qualities. Reiterating our phrasing above, then, one could summarize that the actual 'making' tends to follow the clock, while the 'future' is oriented mainly along imaginaries and narratives.

Taken together, the temporalities of future-making seem to incorporate several essential ambiguities: Modernity has rendered the future both malleable and uncertain, and recent social and institutional transformations have exacerbated uncertainty. The socio-temporal order that frames social life adds to the predictability of the future but reduces the scope for substantial change. Engaging with this order, however, seems to constitute a powerful act of future-making in itself. Finally, future-making is genuinely entangled with the chordal triad of past, present, future. Acting in the present, then, has an impact beyond the current moment. In turn, visions of the future change the ways we act now.

In the next two sections of this chapter, we look into how these ambiguities translate into the actual practices of urban future-making. That is, we discuss how built environment professionals address and try to cope with the outlined time-based ambiguities, and we probe the role of urban matter with regard to these ambiguities.

Plans, projects, experiments: Temporalities of embracing urban futures

Put broadly, there are two temporal orientations that professional urban future-makers may (and possibly need to) adopt when seeking to come to terms with the future. The first aims at the *stabilization* of interactive or collective action for the time to come. This thrust parallels what Barbara Adam and Chris Groves (2007: 6, 39) call 'the future tamed'. In contrast, the second orientation focuses more on *transformation*, i.e. on the 'projective' tone in Emirbayer and Mische's (1998: 970) 'chordal triad'. While it is the projective capacity that is usually considered the core competence of architects, planners, and civil engineers, their professional expertise consists in the combination of both, that is, in the capacity of imagining as well as securing the materialization of narrated or imagined futures. This double expertise reveals itself in particular in the formats of future-making that built environment professionals usually employ: *plans*, *projects*, and, more recently, *experiments*. All three of these formats not only seek to invent and narrate alternative future trajectories, or to 'formulate and visually represent conjectures' (Thompson and Byrne, 2022: 250) about the time to come, they also seek to tame this time. And each of these formats exhibits its own set of temporalities.

Plans, most clearly, are to control the future, at least theoretically. In most classic definitions, the actual act of planning implicates two temporally sorted elements that can be ordered in either sequence: On the one hand, planning consists of a series of decisions in which the first decision (in the present) narrows the scope of and thereby establishes the premises for decisions that follow (in the future) (Luhmann, 1971; see Ibert in this volume). On the other hand, planning involves the development of objectives or visions for the future and the prescription of actions designed to achieve those objectives (Wildavsky, 1973); the plan for the *future*, then, 'acts […] as a vehicle for *present* action' (Abram, 2014: 131). As a rationalist variant of this latter order, planning anticipates future developments – for instance, with regard to employment or population growth – and derives actions from those anticipations aligned with projected needs (Beauregard, 2015: 153).

The temporalities of planning, when explicitly discussed in the pertinent literature, reach far beyond the purposeful ordering of elements related to decision-making and the ambition to tame the future. Needless to say, planning takes place 'in time' (Beauregard, 2015: 152); this time is yet composed of 'pre-existing' (ibid.: 156) but multiple temporalities – for instance, of different land

uses or trajectories of local neighbourhoods; of different time horizons that plans for the future are conceived to cover; or of different ways of mobilizing or rejecting the past (ibid.: 152 ff.; see also Nettelbladt in this volume). Some authors elaborate on this multiplicity by focusing on the 'contrasting perspectives' (Lennon and Tubridy, 2023) of professional planners on one side and residents on the other. Simone Abram's (2020) detailed account of village expansion plans northwest of London shows a drastic case in point: Planners seek to come to grips with a tense housing market, whereas residents follow the vision of a 'timeless […] and idealized image of Englishness' (ibid.: 74). Instead of being able to shape and control future trajectories, planning implies navigating different and partly conflicting temporalities. However, planning also actively shapes time by 'marking' (Beauregard, 2015: 156) or 'manipulat[ing]' (Abram, 2014: 129) it. Robert A. Beauregard (2015: 157), in this vein, refers to 'time-defining moments'. Drawing on Bruno Latour's work, the author argues that such moments, e.g. the Paris agreement on climate governance, may (re-)stabilize realities and that this stabilization affects both the past and the future.

Much of the literature on the temporalities of planning addresses the changes that institutionalized planning has undergone with regard to time over the last decades; most accounts link these dynamics to the ongoing neoliberalization of Western economies and societies. Against that background, scholars have mainly addressed planning's time horizon into the future and the speed/duration of the planning process. Abram (2014: 131), for instance, identifies the loss of planners' responsibility for the 'middle-distance future': The focus is increasingly on 'Contemporary Time, […] the temporal mode of market transaction' that 'implies a logic of immediate return'. In addition, planning has increasingly been criticized for slowing down urban development, and pleas for acceleration and short-term project-led interventions have proliferated (Dobson and Parker, 2025) in order, for instance, to better align plans with real estate investment cycles. Against this backdrop, Mark Dobson and Gavin Parker (2025) – drawing on Helga Nowotny's concept of *Eigenzeit* – make the case for slowness. In quite a different vein, however, Mike Raco, Dan Durrant, and Nicola Livingstone (2018), building on research into the London planning system and real estate market, call into question how slowness paired with planning is juxtaposed against speed paired with real estate. Also private sector developers, the authors highlight, may hail the deceleration of processes as long as it secures lasting revenues.

Projects, from a critical planning and urban studies perspective, epitomize what Abram (2014: 131) calls 'a logic of immediate return' – a short-term, deliv-

ery, and profit-oriented approach to urban future-making. A 'projectification of urban change' (Torrens and von Wirth, 2021) is blamed as 'the Trojan horse of local government' (Fred, 2018). In a more positive tone, Beauregard (2015: 169) acknowledges that project planning might create a 'new commitment […] to possibilities' (ibid.: 170). Conceptualizing projects from an organizational angle, as 'temporary organizations' (Lundin and Söderholm, 1995), opens up a different view onto them with regard to time, temporalities, and future-making. In a way, projects serve as a means to tame the future by creating the idea of a linear time path that is 'cut out' of the 'continuous time flow'. In turn, this linearity renders the project period 'predictable and plannable' (ibid.: 450). Work packages to be performed for the eventual delivery of project outcomes can be efficiently organized along this time path. In addition, the finiteness of projects establishes a sense of urgency: 'time is always running out' (ibid.: 439); the final deadline enforces action towards delivery in time.

And yet, while projects promise to afford agency regarding the future, their effectiveness is limited when it comes to taming our time ahead. This restriction is mainly due to two reasons. First, there is no total linearity and predictability of the project period. The time span between the start of a project and the final deadline is subject to varying process dynamics, i.e. different rhythms and pacings within the project cycle (Jones and Lichtenstein, 2008; Söderlund, 2011). On top of that, even sophisticated project planning cannot fully eliminate ignorance and uncertainties (Kreiner, 2020; Thiel and Grabher, 2024). The longer (and the more complex) a project, the less realistic the idea of predictability is (Brookes et al., 2017). When it comes to the built environment, then, an effective taming of the future through projects might hold for small-scale and routine interventions such as single buildings; more complex projects that may also follow a transformative ambition tend to remain ventures into the unknown.

Moreover, the future does not end with the project deadline. We can therefore frame the temporality of projects by describing them as 'episodes' (Thiel and Grabher, 2021) within longer-term organizational, relational, or institutional contexts (Engwall, 2003; Grabher, 2004). This episodic nature is often conceived as functional, in terms of intended organizational change – 'transition' (Lundin and Söderholm, 1995) or 'innovation' (e.g. Davies, 2014) – in the related firms and industries. However, the functional relation between temporary structures and their more permanent environments is less straightforward than one would expect. Projects are regarded as effective vehicles of learning, but as essentially myopic when it comes to transferring

project outcomes into the post-project period. Project organizations, hence, suffer from what Grabher (2004) calls 'organizational amnesia'. Transition and innovation dynamics, it is argued, scatter across a diffuse relational and institutional space, the 'project ecology' (ibid.). When it comes to projects of urban future-making, the diffuse nature of such an ecology is particularly evident. Technically, the built environment essentially consists of 'one-offs' moored in specific spots on the earth's surface and 'assembled from myriads of components' (Thiel, 2021). While each building as a unique assemblage lives on, the lessons drawn from putting it together sediment only in parts, if at all. What is more, assembling built environment projects happens across 'an inter-organizational landscape' (Havenvid et al., 2019: 5). This diffuse landscape does not afford an organizational core in which project experiences can be transferred into a post-project future.

Urban experiments or *living laboratories*,[1] with some justification, can also be framed as 'temporary organizations' (Mukhtar-Landgren, 2021): Different stakeholders from the private and public sectors, research institutions, and civil society temporarily join in order to develop and test new practices and technologies in urban real-world environments. However, the temporariness of experimental ventures goes beyond that. Experimental formats are 'ephemeral interventions' (Wentland and Jung, 2021; Meinherz, 2025), that is, their transitional nature relates also to the outcome. Urban laboratories create new constellations in given settings in order to try out whether or not these constellations work and create added value; these constellations are dismantled once the experiment is over. Also, urban experiments are aimed at transition, or at instigating 'permanent change' (VanHoose et al., 2022). Mostly building on the multi-level perspective (MLP) concept from transition theory (Geels, 2002), experiments are framed as generators of niche innovations that need to be adopted in or translated to the 'regime'.

When it comes to temporalities of urban experiments more explicitly, several aspects can be pointed out: Most fundamentally, there is an inherent tension between the shortsightedness and project-based composition of experimental interventions and their ambition of achieving long-term change to mainstream social behavioural and institutional patterns (e.g. Manganelli, 2024). Maarit Särkilahti, Maria Åkerman, Ari Jokinen, and Jukka Rintala (2022: 1350) argue that 'the creation of transformative capacity via experimentation

1 There is an extensive and increasing body of literature on urban experiments and living laboratories. As a key source and overview, see Bulkeley et al., 2019.

requires a long development trajectory extending beyond a single experiment'. Transforming both inert patterns of everyday life and established institutional settings takes a long time and occurs only incrementally. Moreover, also experimental formats require navigating different temporalities. For instance, in their study of the experimental implementation of a circular district in the city of Tampere, again Särkilahti, Åkerman, Jokinen, and Rintala (2022) emphasize the competing timescales of land-use planning, the overall laboratory format, and specific technology instruments. And yet, competing temporalities can also afford opportunities: Franziska Meinherz (2025) foregrounds the serious disruptions engendered by the Covid pandemic that functioned as a leverage for trying out solutions, particularly in the mobility sector, that under normal circumstances would not have had any chance of being implemented. Finally, the timing of experiments is regarded as crucial (Meinherz, 2025). The timing question relates, for instance, to the alignment with electoral cycles, but also to annual seasons: Starting to open street space for other uses than car traffic in winter would certainly not engender prompt adoption by users.

In addition to the outlined ambivalent temporal features of experiments, these interventions, though ephemeral, have the potential of funnelling (and even exacerbating) conflicts about the qualities of urban futures (Günay, 2025). Based on a recent study on street experiments in two German cities, Melis Günay maintains that conflicts in arenas related to the experiments have a temporal dimension: They reflect and 'funnel' (ibid.: 123) wider societal disagreements about what transformations are necessary for a sustainable urban future. In their work on current societal polarization dynamics, Steffen Mau, Thomas Lux, and Linus Westheuser (2023) locate these in a 'today-tomorrow arena'. As experiments temporarily, but realistically, anticipate alternative futures of the urban built environment, they render transformation – and potential concomitant sacrifices – tangible. Experimental interventions in the built environment can therefore turn into what Mau, Lux, and Westheuser (2023) call 'trigger points' of polarizing dynamics (see also Grubbauer et al., 2024).

Taken together, all three of the examined modes of how built environment professionals seek to embrace the future seem not able to factor out the tensions inherent in the ambition to both stabilize and transform. Plans are supposed to gain control about collective urban futures, but planners face multiple temporalities and conflicting perspectives about how the future should look like; projects are good at delivering tangible outputs, but tend to fail in reaching beyond their temporal boundaries; experiments also exhibit difficulties in creating longer-term impact. What is more, they even fore-

ground divergent visions of the future and thereby may exacerbate societal conflicts. And yet, the temporalities of urban future-making offer options for agency – through proactively addressing time: 'marking' it (Beauregard, 2015: 156), leveraging different temporalities, or simply choosing the right time for whatever activity. Yet, when dealing with urban contexts, professionals are confronted with the temporalities of the built environment; handling urban matter brings about a range of temporal complexities to be discussed in the next section.

Substance, skills, and future demands: Temporalities of handling urban matter

One of the most fascinating things about cities is their longevity. The buildings that shape the face of cities inevitably stem from different historical periods, in most cases extending beyond the lived experience of any single generation. Depending on the *zeitgeist* and the relevant identity narratives, such historic buildings are attributed societal value. They stand as witnesses of past events and are perceived to convey stories about how life unfolded in past times (Schlögel, 2003). Less visible but even more long-lived are the structures beneath the surface of cities. The material infrastructures that constitute the backbone of cities are often their oldest material elements. In the European context, most parts of the infrastructural networks of modern cities emerged in the 19th century to provide water, sanitation, gas, and electricity (Lees and Lees, 2007). These networks and technological systems have survived much of the destruction of World War II as well as more recent periods of urban transformation, and as Mikael Hård and Thomas Misa note, over time they 'have become so common and pervasive in everyday life that they mostly inhabit only the background of our consciousness' (Hård and Misa, 2008: 8). Yet, also elements of premodern infrastructures have left their imprint on cities, with road networks of ancient times or medieval fortifications still shaping the layout of urban spaces today. Thus, the longevity of cities is manifested not only in single objects, but also on the level of infrastructural networks, settlement patterns, and urban morphology; all of this is foundational for present-day social practices, cultural meanings, and planning policies, even though the political dimension of infrastructural networks as 'hidden underbelly' of the city usually remains less visible (Moss, 2020: 2).

Yet, despite rich historical knowledge and methods of modern archaeology including radiocarbon dating, DNA analysis, and satellite imagery, which allow the age and location of historic built structures to be determined with much precision, knowledge about the material substance of contemporary cities is necessarily incomplete. Cities usually have a multitude of historical layers and are products of incremental processes that evade complete documentation. This relates also to questions of resource flows and material use that shaped daily life in the past, as these were rarely an object of historiography, and historians have only fairly recently started to examine such questions in the growing field of urban environmental and material history (Schott et al., 2005; Haumann et al., 2020). In the case of construction, for instance, building documentation has not been regarded as a relevant historical source and in many cases has been lost over time or is incomplete, even for buildings of the 20th century (see Meyer in this volume). Thus, urban construction is still full of surprises and encounters with artefacts of the past in different stages of aging and decay. Moreover, what is recognized only recently, is that construction sites also allow for encounters with the multispecies world found in soil and the subterranean realm, leading to potential disruption, delay, or even complete blockage of construction work – these encounters 'could principally change *everything*' as Christine Neubert points out with reference to the agency of trees and their root activities within roadworks (2025: 226; emphasis in original). The argument advanced here is that *partial knowledge* is indeed a constitutive feature of dealing with urban matter. This partiality or incompleteness is essentially temporal, i.e. it results from the longevity of cities and their co-evolution with the related ecological systems, but it is also due to several other factors that are concomitant with history and are less obvious, as will be shown in the following. We argue that a more fine-grained inspection of the temporalities of urban matter is necessary, taking into account not only the materiality and form of existing settlement patterns but also the influence that the historic evolution of building materials exerts on today's actions and decisions around urban futures.

Let us now look at the first aspect in terms of the physical *substance* of urban matter. Admittedly, premodern materials in today's cities are rare, as most of the substance is now from the 19th to 21st centuries. Concrete is the modern building material par excellence, though it is complemented by steel and other metals. These materials are pervasive and appear normal in today's urban contexts (Forty, 2012). Yet, it has become increasingly clear that modern urbanization and its practices of building and construction are based on a massive

externalization of ecological and social costs (UNEP, 2025). Whole landscapes have been altered due to the sourcing of materials for modern construction. This includes, most importantly and most visibly, the mining and processing of coal and metal ores, but more recently, scientists have expanded their analysis of this dynamic to include other materials, such as siliceous sands for glass production, limestone for iron processing and cement production, as well as very basic minerals such as stone, gravel, and sand needed to produce concrete (Smil, 2014; Edensor, 2020; Haumann, 2023). Sites of resource extraction that emerged in times of industrialization have, in the past decades, become globalized. Even sand as one of the few remaining 'common-pool resources', i.e. resources 'open to all because access can be limited only at high cost', is now becoming a global commodity – thus the sites of extraction are growing in size and the resource frontier is continuously expanded to new territories (Torres et al., 2017: 970).

Today, faced with the increasing scarcity of natural resources, scientists and practitioners have a high interest in understanding the built environment as a source for the reuse of building materials, or of material in general. Urban mining approaches attempt to map out and calculate these resources (Heisel and Hebel, 2021), whereas more comprehensive research programmes attempt to map all urban resources and material use into comprehensive models of metabolic flows (e.g. Schiller et al., 2017; Heeren and Hellweg, 2019). It has now become clear how the resources constituted by the built environment, including waste and particularly construction waste, are – at least theoretically – extremely valuable. However, in practice the circularity of such resources is inhibited by limitations in how material flows are governed and managed; technical methods also need to be advanced before these materials can efficiently be separated into usable components that are also able to meet regulatory standards (e.g. Kuchta et al., 2021). A main challenge to overcome is the diversity of modern construction materials; since World War II, synthetic materials and chemicals have become common in construction waste, thus when replacing buildings, such complex mixtures of materials are difficult to sort and isolate for reuse (e.g. Schnell et al., 2024).

A second aspect relevant when discussing urban matter relates to the *expertise and skills* of handling such matter. The emergence of the modern professional world of architecture, planning, and engineering was accompanied by a division of labour that created a distance, or gap, between built environment professionals with an academic education and those with a focus on execution, such as the manufacturers and suppliers of building materials

and products, the craftspeople and specialists in different trades, and the construction workers on-site (Sage and Vitry, 2018; Dimitrova, 2024). A result of this division is that specialized knowledge on the handling of materials has gradually been lost, especially with regard to historical materials. In European contexts, the numbers of young people choosing a professional education in the skilled crafts that contribute to building are constantly decreasing, and many local craftspeople have problems finding successors to whom they can hand over their business when they retire. These structural problems create a knowledge gap, as high-quality execution depends on skilled craftsmanship, especially for renovations and adaptations that defies standardization and require customized solutions. In exceptional cases, local clusters of high-quality craftsmanship together with professional expertise can emerge (Grabher, 2018); these collaborations allow trustful relations to be developed between built environment professionals and construction firms and lead to innovation in the industry (which is usually renowned for its lack of innovation) (Thiel et al., 2021).

Yet, at the very end of the supply chain is the local construction site, which is and will, at least in the near future, still be a site of hard manual labour. Within the labour markets of Western societies, the construction industry stands out for it precarious, unregulated, and dangerous jobs that sometimes cost lives (Sage, 2013; Torres et al., 2013). To deliver projects as cheaply as possible, costs for human labour on the construction site are minimized through various strategies: Commissions are outsourced to several chains of subcontractors, with individual workers often forced to act in forms of false self-employment. Media coverage has reported that, on large construction sites, knowledge about who is present and which processes they are in charge of is mostly inaccessible to the public administration responsible for enforcing quality standards (Heinemann and Twickel, 2024). In European contexts, language barriers also play a role, as construction work is mostly carried out by migrants. For field research, the construction industry is a difficult terrain, with construction sites being mostly inaccessible to researchers, and because of the gendered nature of the business (Sage, 2013).

The third factor contributing to our limited understanding of urban matter is the *uncertainty around the conditions* under which buildings and infrastructures will have to function in the future; again, this has consequences in terms of the temporalities involved. New conditions brought about by climate change and extreme weather events will affect building materials, but exactly how these materials will react is often unclear. Importantly, this has a temporal

dimension: The lifespan of urban matter differs depending on the substance. Lifespans of modern buildings are calculated with established standards. Yet, such calculations are now up for revision, as no prior experience with the new conditions exists, and an overhaul to risk-management is needed as well (Alfen et al., 2010), especially given the recent ambition to include aspects of social and ecological sustainability previously not considered in risk calculations (e.g. Backes and Traverso, 2024).

Furthermore, uncertainty is also derived from changing expectations and daily practices around the reuse of resources and the priorities given to keeping existing structures (Gram-Hanssen and Georg, 2018; Shove, 2018). Life cycle calculations now have to be revised or even calculated for the first time. The latter holds for objects that exist much longer than they were meant to, or for objects that eventually turned out to serve a purpose different from what was originally conceived (Petit-Boix et al., 2017). Examples of this include transport infrastructures, such as bridges or tunnels, that have outrun their projected service time but are still operational due to additional reinforcements (e.g. Steinbock and Wetzel, 2021). Lastly, also practices of maintenance and repair are subject to change in the future. Depending on financial resources, political priorities, and ownership changes, such work is sometimes higher and sometimes lower on the agenda. Such dynamics create conflicting temporal horizons to arise, as repair and maintenance cycles need to be planned for and calculated into a future far beyond the short-term cycles of political elections. This is particularly complicated for overlapping and entangled systems of different infrastructures as the work of Lena Enne shows (see Enne in this volume). Similarly, Olivier Coutard in his discussion of the temporal registers of infrastructure points out how 'infrastructure-based futuring' is based on the 'promise of future improved *material* conditions' (Coutard, 2024: 80; emphasis added); a promise that appears increasingly hollow in the face of present challenges.

Interestingly, a return to natural building materials is, at the moment, seen as promising. It is hoped that these materials can prove to be more resilient and adaptable to new climatic conditions, and possibly more sustainable in terms of the energy needed for their production and their environmental impact (Posani et al., 2025). Fully compostable materials such as wood, earth, organic fibre, adobe, and others are also discussed in the light of their suitability for circular approaches. However, problems of sourcing are partly ignored in the current professional discourse, or sourcing information is difficult to come by due to a lack of transparency and knowledge around the commodity chains.

This fetishism around natural material as 'noble' (Vellinga, 2013) is sometimes disturbing, as at closer inspection much of these practices are not necessarily sustainable (Grubbauer, 2017).

In sum, these various factors contribute to decisive knowledge limitations around urban matter. Importantly, the layering and entanglement of different materials in urban environments has a temporal dimension: It influences the calculation of lifespans, it shapes construction work on site, and it preconditions the temporal rhythms of repair and maintenance. Moreover, the chemical processes that modern construction materials and urban metabolic flows generate over time, are becoming more visible now. Many of these processes are slow and take place invisibly, but they contribute to polluting urban soil, water, air, and other matter in the long run (Kowalik et al., 2019). This partial knowledge, which becomes visible and takes effect only over time, seems to be paradoxical, given the expertise of the professions involved, the high level of bureaucracy around construction in Western contexts, and, most recently, the promise of full transparency that is associated with digital data. Various digital models are currently being developed to make the built environment, including its material properties, more or even fully accessible to professional analysis and to allow for better predictions of future developments. Yet, there is a risk that the abstraction behind such models and the selectivity of the data used will remain veiled. Indeed, these models may further serve to distance professionals from the on-site handling of matter, and thus complicate the temporalities of urban future-making.

Conclusion

With this chapter we have sought to purposefully connect conceptual work on urban future-making and on time and we proceeded in two steps. First, we mapped the relation between future-making and time, starting from three conceptual contact zones between the two notions (and the literatures behind them): the advent of open but increasingly uncertain futures in the late modern (or so) world; the emergence of a 'socio-temporal order' (Zerubavel, 1985) that frames forward thinking but may also be an object of engaging with the future; and the embedding of human agency into the flow of time (Emirbayer and Mische, 1998), implying an intricate relation between enacting 'present futures' and imagining 'future presents' (Esposito, 2024). Our other step comprised translating this map onto our idea of urban future-making

from two sides: through the future-making formats that built environment professionals usually employ to both envision and control the future, and through the complex temporalities the physical built environment exhibits and that future-makers need to deal with.

Neither the mapping nor the translation is likely to have reduced the complexity of how time and temporality impinge on urban future-making. From whatever direction we look at this conjunction we find that urban future-makers essentially face what one could call a *temporal mess*, i.e. a multiplicity of interconnected temporalities, from the lifecycles of grains of sand to the vision of climate-neutral cities mankind is supposed to realize within the next 25 years. Navigating this mess, it seems, is what professional activity in and with the urban built environment is fundamentally about. Both in research and in professional built environment practice we need to acknowledge that. This is not to say urban-future making implies arbitrarily struggling with a time chaos. We see three more specific take-aways from this chapter that might give some orientation. These conclusions have the modest ambition to both inspire further research on time and future-making and support the actual navigation of professional practice in the 'turbulent future' (Amin, 2013) that we are likely to face.

First of all, we hold that the mess should not be regarded as a problem but as an asset. 'Embracing' instead of seeking (in vain) to eliminate 'temporal ambiguities' (Thiel and Grabher, 2021), tensions, knowledge gaps might be a way to deal with the mess in a proactive and productive fashion. Embracing the mess might help avoid difficult trade-offs (ibid.) and enable future-makers to seize opportunities they would not have even identified otherwise, such as the mentioned occasion of using the Covid lockdown for street experiments. This is no plea for a disorganized professional practice – rather for what Helga Nowotny (2017) calls 'orderly mess:' In our existence 'poised between order and disorder', this orderly mess is 'the promise of an always precarious, but perhaps achievable, optimal balance between them' (ibid.: 14).

And, secondly, part of this mess owes to the complex materiality of the urban. Each of the multiple materials of the city exhibits its own temporality, or *Eigenzeit*, as again Nowotny (2017: 61ff.) would phrase it. These *proper times* of urban matter reach far beyond what we usually perceive as the astonishing permanence and resilience of urban structures. They carry millions of years of history before they are used as building material, and this use has an imprint that reaches far into the future and hinges on complex encounters with the multispecies world. Needless to say, the research and practice of urban future-mak-

ing must take these complex and far-stretched temporalities seriously. Doing so does not necessarily seek to sideline the social dimension of built environment research. Rather, taking materiality seriously calls for an intensified dialogue between research and practice as well as between different disciplines involved in urban future-making.

Finally, this chapter is a claim for explicitly and deliberately incorporating time and temporalities as a crucial element of urban future-making, both in research and in practice. Recognizing different, but entangled temporalities; acknowledging and possibly leveraging legacies of past future-makings; admitting that 'temporal structures' (Orlikowski and Yates, 2002) powerfully frame the ways of how built environment professionals can use their tools, but realizing that using these structures – 'temporal structuring' (ibid.) – offers novel sources of agency – a temporal lens helps us to better capture the contingencies of urban futures both analytically and in terms of professional practice: While the future is likely to differ from what we expect, there is in fact scope for urban future-making.

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Leveraging History and Opening Futures

4. Urban futures in the dialectic of Indigenous real estate development

Thilo van der Haegen

Introduction

The City of Vancouver, Canada is located on land that the xʷməθkʷəəm (Musqueam), Sḵwx̱wú7mesh (Squamish), and səlilwətaɬ (Tsleil-Waututh) First Nations claim as their traditional, unceded territory. Since the city's foundation in 1886, the three Nations have largely been displaced from their territory and Vancouver has grown to be a major regional centre of a metropolitan area of over 3 million inhabitants. Population growth and the influx of rent-seeking capital have made the region well-known for its high real estate activity and exceptionally high housing costs (Ley, 2021). This means that the land that the three Nations claim as their traditional territory is increasingly urbanized and that their membership (in the 2016 census, the Musqueam had 1660, the Squamish 4060, and the Tsleil-Waututh 1855 members) is increasingly living in (sub)urban contexts (Government of Canada, 2024). Often based on complex histories of dispossession and repossession (van der Haegen and Whiteside, 2025), the Nations control different land parcels and some of them are located very centrally in the city of Vancouver. On these central parcels, the three Nations are now engaging in what will amount to some of the largest real estate developments Canada has ever seen.

Real estate development has been actively pursued by First Nations in the Vancouver region for some time, for example through the Musqueam's leləm̓ development near the University of British Columbia or the Tsleil-Waututh's Raven Woods development in North Vancouver, each development offering around 1,000 housing units. However, the scale of operations is changing. Through their MST partnership, the three Nations currently collectively develop the Heather Lands project with around 2,600 units. Beyond that, even

bigger developments, such as the Squamish Nation's Seńáḵw development with around 6,000 units and MST's Jericho Lands development, envisioning 13,000 units, are under construction or in planning. With their plans to construct tens of thousands of apartments over the next decades, the three Nations are thus on track to becoming some of the largest real estate developers in the region. They are therefore actors that profoundly shape the urban futures of the city of Vancouver and its political economy of real estate.

To obtain a more thorough understanding of such First Nation real estate development, I hereafter observe the political-economic structures of the Seńáḵw development, some of the efforts that have enabled it, and the futures it might create. Seńáḵw takes place on a small 4.25-hectare land parcel that the Squamish Nation reclaimed in 2001 after decades-long legal proceedings against the Canadian government. The parcel is centrally located next to downtown Vancouver and the beaches of the Kitsilano neighbourhood. It therefore offers the possibility for highly lucrative real estate development. On Seńáḵw, the Squamish Nation aims to pursue 'highest and best use' development (Blomley, 2004), which signifies the ambition to maximize revenue streams from rent extraction. The Nation does this by currently constructing over 6000 housing units in 11 towers, some of which will be over 50 storeys high. Most units will be rented out at Vancouver housing market rates. This will potentially enable massive financial profits for the Nation, but also for real estate development companies and institutional capital involved in the development.

In this chapter, I observe the emergence of such large-scale First Nation real estate activity through a dialectical lens (Harvey, 1996; Marx, 1973). This allows me to describe the urban futures that are made through Indigenous real estate development as the product of mutually constitutive (i.e. dialectical) relationships between historically grown structures of settler colonialism and agency in reshaping such structures in the present. Real estate developments like Seńáḵw arise from the broader structures of the political economy of the settler-colonial city (Dorries et al., 2022), meaning the complex history of land dispossession and repossession under the drive to create revenue-generating assets from that land (van der Haegen and Whiteside, 2025). However, these broader structures are also currently reconfigured by First Nation agency, here observed through the actions taken by First Nation leadership to create political-economic structures that enable real estate development to their own ends.

I therefore describe the role of First Nations as urban future-makers in Vancouver and examine the futures they envision. In doing so, I contribute

to broader discussions around urban future-making and agency (Grubbauer et al., 2024). I highlight how urban futures emerge from the dialectical tensions between historically grown structures and agency in renegotiating these structures in the present. The choice of this dialectical perspective follows this book's theme in describing urban futures as contingent (i.e. indeterminate). In this specific context, this means recognizing the settler-colonial structures that confine what kinds of urban futures are possible in Vancouver and acknowledging the decades-long work through which Indigenous actors have created current conditions and shape emerging futures. Describing these urban futures as contingent means acknowledging that they are neither completely predetermined nor entirely open. Rather, the deciding factor for what kind of futures arise is how a system's internal relations come together and are negotiated in the present.

The real estate development I observe has the potential to fundamentally change First Nation communities, because it promises the partaking Nations desperately needed revenue to fund infrastructure and services and because it positions them as powerful actors in the region's political economy. The very groups that have been displaced from their lands by the colonial process that is fuelled by hunger for land and revenue extraction now find themselves in powerful positions in that system and use it to pursue their own agenda.

Indigenous agency in the settler-colonial city

To embed First Nation real estate development in scholarly debate, I use this section to review literature on the political economy of settler colonialism and of the settler-colonial city. Based on that literature, I discuss the contradictory ways in which First Nations are becoming large-scale capitalist actors in 'settler-colonial regimes [that] are co-produced in relation to the global political economy of capitalism' (Pasternak and Dafnos, 2018: 740).

Research has clearly established settler colonialism as a process that seeks to open Indigenous lands to capitalist circulation (Coulthard, 2014). Scholarship highlights that settler colonialism is by no means a phenomenon of the past, but that Indigenous dispossession and structural injustices, as well as resistance against these continue to occur in the present (Coulthard and Simpson, 2016; Simpson, 2011). Indigenous 'rights and relationships to land are [still] rendered unintelligible' (Sylvestre and Castleden, 2022: 423) by the settler-colonial maxim of appropriating land and enabling accumulation.

Scholars are thus deeply sceptical of capitalist development as a means for Indigenous resurgence (Pasternak, 2015; Sommerville, 2021), because through such means 'struggles against dispossession too easily become struggles for possession' (Porter, 2014: 401).

This is not to say that capitalist development cannot hold the potential for 'decolonization and transformative place-making' (Tomiak, 2017: 940), but that emerging spaces might be highly contradictory. Indigenous groups might actively shape the future of their lands and reap monetary benefits that might hold transformative potential (Cattelino, 2008), while lands are first and foremost evaluated for their economic potential. Engagements with capitalist structures, while an inherent experience of life under settler colonialism, are thus controversially discussed amongst Indigenous scholars (Coulthard, 2014; Simpson, 2016, for an overview, see: Atleo, 2015). Opinions range from voices for culturally-specific engagements with capitalism to outright rejection. It is not my place to contribute my own standpoint to such discussions. Rather, I aim at substantiating the contentious nature of Indigenous economic development for scholarly debate. I describe the emergence of large-scale, highly profit-oriented real estate development as driven by Indigenous agency and that agency as circumscribed by settler-colonial structures. This underlines that part of a nuanced depiction of settler-colonial space needs to allow for descriptions of Indigenous capitalisms. Otherwise, this would 'other' Indigeneity as the antithesis to exchange value and with that to modernity (Cattelino, 2008: 102).

Settler-colonial cities thus emerge as highly contradictory (Hugill, 2017; Simpson and Hugill, 2022) because they are both embedded in transnational capitalist dynamics, and heterogenous spaces navigated by Indigenous actors (Dorries et al., 2022; Mays, 2022). This is especially valid in relation to questions of land ownership, because many Indigenous peoples raise claims to the land from which they have been dispossessed. In Canada, the Supreme Court has recognized 'Aboriginal' claims to land as 'some form of un-ceded indigenous interest to the land' (Blomley, 2015: 171). However, what this exactly means remains unclear. Until today, no land treaty settlements exist with the Musqueam, Squamish, and Tsleil-Waututh First Nations, who claim Vancouver as their traditional, unceded territory. Therefore, the colonial property system stands in an unclear relationship with their land claims.

The creation of private property and the possibility for rent extraction therefrom have been and continue to be inherent drivers of the settler-colonial process (Bhandar, 2018; Blomley, 2004). In Vancouver, the resolution of

unclear property relations is therefore key to enabling continuous capital accumulation from the city's globalized and financialized housing market (Ley, 2021). Developments like Seńáḵw are thus part of a dynamic of 'settling' the city (Blomley, 2004), because to enable capital accumulation, First Nations overcome unclear property relations and create secure notions of private property on their lands (Whiteside, 2020). Below, I will detail some of the dynamics through 'which state-Indigenous-private interests converge in dynamic, local processes' (Pasternak, 2015: 187) that now enable the reproduction of the Vancouver model of real estate development on Indigenous land (van der Haegen, 2024). However, this may simultaneously offer the possibility to establish a more 'contested' (Dorries, 2023) notion of urban space, as First Nations are looking to make their own urban futures.

Understanding urban futures through dialectics

In this contribution, I seek to understand First Nation real estate developments as urban futures that come into being in the contradictory spaces of settler colonialism. To that end, I hereafter apply a dialectical lens, as brought forth by Karl Marx (1973: 33; Harvey, 2023: 29) and subsequently more explicitly worked out by David Harvey (1996). Such an approach allows me to account for the ways in which the political-economic structures of the settler-colonial city shape Indigenous real estate development, and for how such real estate development is shaped by First Nation agency.

Marx described the contradictory nature of capitalism as a system that is constituted of individual pieces to form a larger, ever-changing dynamic so that capital can become capital, as it continuously circulates (1973: 371). Dialectical analysis entails accounting for the mutually constitutive relations between a broader dynamic (the totality) and the elements (moments) that comprise it (Harvey, 2023: 73, 127). The totality 'appear[s] as an objective interrelation, which arises spontaneously from nature' but it is actually made up 'from the mutual influence of conscious individuals on one another, but neither located in their consciousness, nor subsumed under them as a whole' (Marx, 1973: 126). Therefore, a dialectical perspective perceives of interrelated moments that create a totality that is heterogeneous, contradictory, and in constant motion (Swyngedouw, 1999: 94).

Dialectics are thus no tool for subsuming findings to totalizing theory, but a tool for open and partial description of complex relations with an insistence

on a system's indeterminacy (Sheppard, 2008: 2606). This means that a dialectical perspective perceives of urban futures as contingent in the sense that they are neither totally predetermined nor entirely open. Instead, urban futures come into being in 'a constellation of contradictions between internally related parts of [that] society as a totality' (Castree, 1996: 345). From an analytical middle ground that allows for an active component in the formation of space but also takes seriously the structural forces around it (Christophers, 2014), we can observe First Nation real estate as a materialization of the dialectical relationship between broader structures of settler-colonial capitalism and agency in 'individual moments' based on the relationality and circuitry of causality in the totality (Chatterjee and Ahmed, 2019: 376).

Urban futures, as envisioned in the form of First Nation real estate, are therefore contingent because First Nation actors actively create these urban futures and they could do it differently, too. This is remarkable, because First Nation governments, who are actors that have historically been disenfranchised, now have substantial influence in creating urban futures for the city of Vancouver. Through a dialectical perspective, however, such contingency, or the power to do otherwise, is also limited by prevailing structural forces. In this case, First Nations also reproduce the predominant modus of capital accumulation in the real estate sector through their future-making. The emergence of First Nation real estate inevitably changes the structures of settler-colonial capitalism in that First Nation governments become powerful actors. However, these structures are also reproduced, and the 'circuitry of capital' (Pasternak and Dafnos, 2018) that has been a driver of Indigenous dispossession (Dorries et al., 2022) is ensured. In the following, I will discuss the political economy of First Nation real estate development. Before that, however, I want to address the perspective I take for this research, and the ethical questions that arise from that.

Ethical questions and methodological approach

Relationships between Indigenous peoples and what was and is understood to be 'science' often have been and continue to be extractive, and scientists often neglect or misrepresent Indigenous perspectives. Scholars therefore advise caution, proper representation of Indigenous worldviews, and reciprocal research practices for research with Indigenous communities (Datta, 2018; McGregor, 2018; Smith, 1999). As a researcher who observes First Nation's real estate activities from the outside with limited insights into First Nation world-

views, I am therefore prone to misrepresent Indigenous perspectives. I nevertheless believe that observing First Nation real estate development from this perspective is warranted if proceeding carefully and if clearly stating the limited explanatory power and the shortcomings of one's perspective.

Studying contexts relevant to Indigenous peoples from a distant perspective needs to be possible. Otherwise, this runs the risk of 'ghettoizing' (Hunt, 2014: 31, in Clement, 2019: 279) research, as much as it would reproduce categories of difference between an Indigenous Other and modernity, and in this case, the urban (Mays, 2022). Where scholars need to be mindful of historical and contemporary colonial structures, research should not be based on assumptions of Indigenous powerlessness and subalternity (Spivak, 1994). This is, because assuming inherent power imbalances reinforces 'unequal, hierarchical power dynamics between researchers hegemonically racialized as "White" and research subjects [...] racialized as "people of color"' (Gani and Khan, 2024: 2), even when such dynamics may not exist. An ethically sound perspective should then account for Indigenous agency, also because Indigenous agency is too often disregarded by scholarship (Carey and Silverstein, 2020), without, however, assuming subalternity.

To find a balance between accounting for Indigenous agency and not risking misrepresentation, I here resort to a dialectical perspective and a focus on the political economy of real estate development. My perspective is that the political economy surrounding the Seńák̲w development – meaning enacted by-laws, specific building properties and densities, financing, publicly presented narratives, and contracts with private sector actors – is itself an expression of the agency of Squamish leadership. However, that political economy also stands witness to the settler-colonial structures that circumscribe the ways in which First Nation agency can be exercised. I therefore argue that I can account for Indigenous agency without misrepresenting Indigenous worldviews by using the political economy surrounding the Seńák̲w development as a proxy for the agency of Squamish leadership within the broader political economy of settler colonialism. In that, however, the explanatory power of my perspective is also limited to the political economy, and it cannot account for a multiplicity of perspectives beyond that.

To understand Seńák̲w's political economy, I compiled data from a broad range of sources. I collected strategy- and urban planning documents from the Squamish Nation government, its subsidiary development company Nch'kaẏ̓, and from involved Canadian governmental bodies. I also assembled a large number of webpages, newspaper articles, social media posts, or records of

events that track the evolution of Seńáḵw, conflicts around it, and attitudes towards the development of Seńáḵw. Lastly, I also conducted a total of 19 interviews with different stakeholders to First Nation real estate development. 6 of these interviews were conducted with 5 Squamish Nation or subsidiary company representatives. I refer to these interviews in my analysis and therefore do not fully resolve the tension between neither wanting to misrepresent Indigenous perspectives, nor wanting to omit Indigenous agency. I therefore reiterate that I do not seek to display First Nation worldviews in this contribution. Rather, I account for First Nation agency as witnessed through the political economy surrounding the Seńáḵw development.

The political economy of Seńáḵw

> We are getting there. To a place of comfort, a place of control, a place that we are in the driver's seat or we are in front of the canoe paddling.
> *Sxwíxwtn/Wilson Williams, Squamish Nation spokesperson (Squamish Nation, 2023b)*

The Seńáḵw development is taking place on a tiny 4.25-hectare piece of reserve land that is today located around the end of the Burrard Bridge that connects Vancouver's downtown with the affluent Kitsilano neighbourhood. Seńáḵw is thus close to some of the most expensive real estate in the whole country. The Squamish Nation currently constructs 6077 housing units in 11 towers that will be up to 56 storeys tall. The first towers are to be completed at the end of 2025 and all construction is to be concluded by 2030. Without being able to do justice to its intricacies, I want to briefly describe the colonial history of the Seńáḵw parcel (Harris, 2017; Squamish Nation, 2024; van der Haegen and Whiteside, 2025). This should thereby not omit the fact that the whole area was and continues to be inhabited by various Indigenous peoples to various degrees (Harris, 1997; Squamish Nation, 2024: 196).

The existence of a village in the vicinity of where Seńáḵw 'the place inside the head of False Creek' is constructed today was the reason for the demarcation of a small 'Indian' reserve in the 1860s. At its largest extent, the reserve

measured a little more than 32 hectares (Figure 1)[1]. This parcel, however, was chipped away at by railway and other development interests, until the last Indigenous residents were displaced from the area in 1913. Legal proceedings for the return of the reserve land started in the 1970s and lasted for decades. They resulted in a court settlement for the unlawful expropriation of reserve land in 2000, and the return of 4.25 hectares of the original reserve in 2001 (Harris, 2017). According to the Squamish Nation's recently published introduction to its history, Nation representatives already established in 1969 that 'Indian Lands had to be used to the best possible advantage so that the band could obtain money to finance its economic development program' (Squamish Nation, 2024: 233). Real estate developments emerging today thus needs to be understood in the context of a long history of tireless resistance against the colonial land grab (Squamish Nation, 2024: 199f) and as part of long-standing efforts to create revenue for the Nation.

Today, Squamish Nation representatives stress both the desire for independence and the need for revenue for the Nation's infrastructure and services as the main drivers behind real estate development. A senior Nation representative describes how developing real estate 'it's really giving us the ability to be self-determined, to be able to create the wealth needed to support our community and our ambitions' (Interview_B3). According to Khelsilem, Squamish Nation Council Chair, this means 'not waiting for the government to do things for us' (Penner, 2020). Through real estate development, the Nation is 'taking control of their future' (Nch'kaẏ, 2023a), and 'control over what happens on our lands' (Khelsilem, in Nch'kaẏ, 2023b).

The Squamish Nation estimates that it needs 'billions' to fund infrastructure and services such as schools, care homes, family and youth support programmes, postsecondary education and affordable housing (Squamish Nation, 2022: 10). A senior representative underscores that 'we can't fund the programs and services and the education and create those affordable rent levels without having somebody be able to pay for it. And so the economic development side is really driving a lot of the Nation's social ambitions' (Interview_B3). According to the Nation's leadership, this means working with a

1 This map is an inaccurate representation based on contemporary geographical realities that serves as an orientation for the reader. It does not depict Indigenous relationships to land, historical land reclamations, or the complex ownership changes over the history of the parcel. Moreover, the focus on a specific land parcel should not imply support for the reduction of Indigenous land claims to individual sites.

system to create value 'from the tiny parcels of reserve lands we were left with after past racist governments seized nearly everything' (Khelsilem and Wight, 2022). Real estate is the obvious choice as a 'means of the Nation looking after itself economically. […] the market in Vancouver really drives real estate to the forefront of a good economic opportunity' (Interview_B4). Thus, while land assetization and real estate development have been drivers of Indigenous dispossession, succinctly summarized by a journalist, in a city 'built on real estate' (Interview_A4), real estate development now materializes as a tool to create a different future for the ancestors of the once dispossessed.

Figure 1: Location of the Seńákw development in Vancouver: the contemporary Seńákw parcel (dark grey) within the largest extent of the original reserve (dashed line).

Source: Government of Canada, 2025; Harris, 2017; Vancouver Archives, [1934] 2025.

The land used for development is reserve land. Land that is – per the federal legislation of the Indian Act – held by the federal government on behalf of a First Nation. Therefore, municipal legislation does not apply. This makes it possible to develop to a much higher density, and with that profitability, than under city jurisdiction. Even for its lack of jurisdiction, the city supports the

development and has negotiated an agreement with the Squamish Nation that clarifies municipal services for it (Squamish Nation and City of Vancouver, 2022).

Because reserve land is nominally held by the federal government, First Nations cannot sell it or use it as collateral to obtain credit. However, as per the Indian Act 38(2), a band may designate land 'for the purpose of its being leased'. On 28 January 2021, the Squamish Nation enacted a bylaw that leased the Seńáḵw parcel for the purpose of commercial development to a partially Nation-owned entity for nominal rent for 120 years (Squamish Nation, 2021). This was preceded by 87% of the Nation's membership voting in favour of the terms of the lease and the proposed development in a mandatory referendum (Fumano and Culbert, 2022). For the development of Seńáḵw, a diverse actor constellation now creates the political-economic realities that make real estate development on and financial profit from Indigenous lands possible.

The partially Nation-owned entity that is now leasing the Seńáḵw land is called Nch'kaẏ̓West. 50% of Nch'kaẏ̓West is owned by Nch'kaẏ̓, the Nation's development arm. Nch'kaẏ̓ was founded in 2018 'to develop, manage and own the commercial entities of the Nation' (Squamish Nation, 2023a: 2), and explicitly 'to (1) limit liability risk to the Sḵwx̱wú7mesh Úxwumixw [Squamish Nation] and (2) separate politics from the business or administrative work they are responsible for' (Squamish Nation, 2022: 16). The other 50% of Nch'kaẏ̓West is owned by Westbank, a Vancouver development company known for its high-end condominium developments. The company has offices in major Pacific Rim cities and has been criticized for marketing its developments directly abroad and with that enabling speculative investment (Cheung, 2018; Gerszak, 2018). Meanwhile, Westbank has sold 20% of Nch'kaẏ̓West shares to the pension fund Ontario Pension Trust (OPTrust). OPTrust manages Ontario public sector pensions and has described Seńáḵw as a 'sustainable' investment that will generate significant amounts of affordable housing. At the same time, OPTrust boasts that its real estate portfolio has made 15% returns in 2022 (OPTrust, 2022: 31–33).

Arrangements between the Squamish Nation and Westbank entail that Westbank is responsible for financing and guarantees, while the Squamish Nation, through Nch'kaẏ̓, provides land at nominal cost; both parties reap 50% of the profits. The development of Seńáḵw proceeds in four phases. For each phase, Nch'kaẏ̓West subleases a part of the Seńáḵw parcel to another subsidiary partnership that Nch'kaẏ̓ and Westbank found. Each sublease from Nch'kaẏ̓West to these subsidiary partnerships can subsequently be used as

collateral to obtain financing for the respective development phase (Squamish Nation, 2023a: 2). In that way, the Nation is protected from financial risk, which lies with Westbank, and it can overcome First Nation lending difficulties stemming from the land's reserve status. Instead of using land as collateral to obtain financing, the Nation uses leases as collateral.

Consequently, the Nation does not have any money invested into Seńáḵw. Its consolidated financial statements only display nominal investments into the Seńáḵw head lease that leases the Seńáḵw lands to Nch'kaẏ̓West, and into the limited partnerships for the first buildings currently being constructed (Squamish Nation, 2023a: 10). On the contrary, the Nation's balance sheet is enlarged by Nation Amenity Contributions. These are a cash contribution at CA$60/ft^2 of floor area that Westbank pays the Squamish Nation at the start of each development phase. For a floor area of 4 million ft^2, this amounts to CA$240 million, though these payments are subject to a reduction based on the square footage of constructed affordable housing (Khelsilem, 2021). In turn, the individual partnerships that sublease land for each development phase from Nch'kaẏ̓West pay Westbank for project management.

The first two phases of the development are financed by a CA$ 1.4 billion loan provided by the Canada Mortgage and Housing Corporation (CMHC) through its Rental Construction Financing Initiative (now called Apartment Construction Loan Program). CMHC is the federal housing agency, and the loan programme is CMHC's main housing financing tool. The loans, CA$668 million and CA$745 million respectively, with 10-year fixed interest rates and 50-year amortizations provide better conditions than any market loan would (Canada Mortgage and Housing Corporation, 2022: 33). The loans are the biggest in CMHC's history, and indeed, as one interviewee remarks, 'I don't think they [CMHC] meet that size of a loan without the Nations' involvement because it comes back to reconciliation' (Interview_A5). The federal government looks to bolster private rental housing construction with the provision of attractive loans. These loans are concurrently also vehicles through which the Canadian state looks to reconcile with colonialism, and they simplify the Squamish Nation's entry into the region's real estate capitalism.

Currently, Seńáḵw is marketed as building 100% rental housing. However, the development partners will actually decide separately whether to build rental or leasehold housing for each of the four development phases based on the financial prospects of each option. According to Khelsilem 'that was really a risk mitigation choice if the market was to change around purposeful rental

and we felt that the condo market was a more prudent or financially beneficial place to go' (Khelsilem, 2021).

Likewise, Seńáḵw's density has increased substantially over the planning process (Little, 2019). Khelsilem comments that the highest density possible is the ideal choice, as that's how the Nation will maximize its revenue (St. Denis, 2019).

Seńáḵw's political-economic structures underscore its fundamental function as a tool to maximize potential revenue streams from real estate assets for the Squamish Nation. Spatially fixing capital (Harvey, 2001) on Squamish land in that way has the potential to tremendously benefit Squamish Nation membership. However, in light of the Nation's position within the totality of colonial capitalism as 'land rich, cash poor' (Interview_A2), Seńáḵw is also going to benefit the Nation's development partners Westbank and OPTrust. As a Nation representative highlights: 'the Nation also is a little bit risk averse' (Interview_B3). It therefore outsources risk to developers and investors in exchange for the opportunity for rent extraction on a massive scale. Another Nation representative explains that 'Westbank is a developer. Fundamentally what it wants to do is: design, build, exit, done. And OPTrust needs to look after pension contributions. So it would be the kind of "person" who would allow Westbank to exit' (Interview_B7). Therefore, Westbank is likely to profit in the short term, whereas OPTrust is bound to profit in the long term.

With their political-economic structures, Seńáḵw and other emerging First Nation real estate developments are relatively similar to 'standard' large-scale Vancouver developments. In Vancouver, high land prices make high density developments desirable. Such projects in turn are capital intensive and therefore only function with the involvement of large financial actors. How Squamish leadership navigates Vancouver's political economy of real estate results in an urban future in which corporate actors are to handsomely profit from the reproduction of an extractive real estate model on Indigenous lands.

Making space for private property

That real estate is offering the best economic opportunities for First Nations to accrue revenue is also owed to several competitive advantages that First Nations have in the current political economy of real estate in the Vancouver region. Leaving aside First Nation development on private land that is also man-

ifesting on a large scale across the region, on reserve land like Seńáḵw, the Nation 'can densify so much more' (Interview_B4). Not constrained by municipal legislation, it can also develop at higher speeds (Nch'kaẏ, 2023d: 2). Additionally, revenue that First Nations or their subsidiaries accrue on-reserve is tax-free, because the Nation is the tax authority on its reserve lands (Campbell, 2015: 40). One Nation representative describes this as 'Nations [are] realizing that [in] the Indian Act and the way the reserves are governed, there's a loophole' (Interview_B4), or what another Nation representative refers to as 'legislative gaps' (Interview_B3).

The First Nations Commercial and Industrial Development Act (FNCIDA), legislation meant 'to establish a First Nations land title system that can support private investment' (Gauthier and Simeone, 2010: 1) is one tool the Squamish Nation uses to fill such legislative gaps. The Nation uses the legislation to create legally certain property relations that enable smooth roll-out of investment. FNCIDA works by allowing the federal cabinet to make specific provincial laws applicable on tracts of reserve land on request. This has for example created the possibility for on-reserve leasehold ownership (Interview_B3). Likewise, the British Columbia Residential Tenancy Act has been enacted on Seńáḵw through FNCIDA (Nch'kaẏ, 2023c: 16). Legislation like FNCIDA looks to align development on-reserve with practices off-reserve 'by essentially reproducing the provincial rules and regulations that apply to similar large-scale commercial or industrial projects' to enable 'highest and best use' (Gauthier and Simeone, 2010: 2). The Squamish Nation sought to enable economic development on its lands within the constraints of the colonial property system for years by lobbying for FNCIDA since before it came into force in 2006 (Gauthier and Simeone, 2010: 2), and the legislation now enables First Nations to establish desired features of the private property regime on their lands. The creation of clear property relations is inherently in the state's interest (Blomley, 2015), and in this case, it has also been actively lobbied for by First Nations to enable real estate development. While critical scholars point to the fundamental role that the creation of private property has and continues to play for Indigenous dispossession (Bhandar, 2018), it is a precondition for the creation of this particular urban future.

By establishing private property relations on Indigenous lands, First Nation real estate development is also enticing for conservative thinkers, because they see the root cause for Indigenous poverty precisely in the lack of private property relations. Creating private property is understood to be a necessary first step in creating the possibilities for capitalist enterprise. This, in turn, is

seen as the solution to overcoming poverty (Pasternak, 2015). Tom Flanagan, a nationally-known neoconservative and advocate for the introduction of private property rights on reserves (Flanagan, 2008: 198) has worked as a consultant for the Squamish Nation. His collaboration with the Squamish Nation further highlights the convergence of contradictory interests around making an urban future a reality, in which First Nations reconceptualize their land as private property to maximize revenue from real estate development.

In 2009, Flanagan presented a report to the Squamish Nation Council based on 'a vision of harmonizing Squamish developments with those in neighbouring municipalities' (Flanagan, 2009: 25). In the report, he advises the Nation to lobby for an extension of FNCIDA that would allow it to collect a property transfer tax. This now enables the Nation to collect a tax if ownership of real estate on its land changes. At the same time, Flanagan has called European civilization 'several thousand years more advanced than the aboriginal cultures of North America' and colonization 'inevitable' and 'justifiable' (ibid.: 6). Asked about Flanagan's views, Squamish hereditary chief Gibby Jacob stated that they were 'obviously troubling, but nevertheless, we have to look at the big picture for our people' (Ferreras, 2009).

The big picture signifies an unlikely actor coalition as the interests of the Canadian state, of corporate capital, of First Nations, and of neoconservatives converge around developing Indigenous land in a highly profit-oriented way. As one interviewee points out: 'the conservatives […] have actually in a lot of ways been trending towards kind of the liberal position on reconciliation' (Interview_B7). This is not entirely surprising, because reconciling with colonialism is here conceptualized as a functioning business case that establishes private property relations on Indigenous lands.

Making Indigenous urban futures

Although the financial benefit of developing Seńáḵw will potentially be significant, it will not materialize in the near future. Fighting for the return of land, lobbying for FNCIDA, and the structures of Seńáḵw today are all part of a long-term dynamic whose economic potential will only be realized in a future 'seven generations down the road' (Wilson Williams in: Fumano and Culbert 2022). Construction costs for Seńáḵw are estimated at CA$ 3 billion (St. Denis, 2019), and Seńáḵw operates under a deficit significant to the Nation's finances (Squamish Nation, 2023a: 7,10). Substantial revenue will only materialize once

loans have been repaid (Khelsilem, 2021). An exception are above-mentioned Nation Amenity Contributions that Westbank pays the Nation for each development phase. In 2023, these increased the Nation's annual budget by CA$ 57 million to CA$ 215 million (Squamish Nation, 2023a).

Seńákw is also not the end of this story. The above-mentioned MST partnership between the Musqueam, Squamish, and Tsleil-Waututh First Nations is the biggest 'private' landowner in the region (Interview_B5), and it was explicitly founded for real estate development purposes. However, the Squamish Nation is also individually planning for future large-scale development. In spring 2023, Squamish and Nch'kaẏ leadership announced a 'landmark' planning process to clarify the use of about 140 hectares of Squamish lands. Among them are 'some of the most important real estate opportunities in the Lower Mainland, if not in the entire country': 'oceanfront' properties on the Nation's Capilano Reserve in North Vancouver (Nch'kaẏ, 2023b). The development of these lands was apprehended at least since the lobbying efforts for FNCIDA when a study to assess their economic potential was conducted by a real estate company from Dubai (Campbell, 2015: 27–29). Seńákw might be the financial basis for the development of these lands, because 'the Squamish Nation relies heavily on leasing revenue. Many leases are due to expire in the next 25 years, developing reserve lands now will ensure financial security in the future' (Nch'kaẏWest, 2023). If the Nation wants to redevelop land where leases that it currently depends on run out, it needs other established revenue sources. Khelsilem hypothetically asks: 'If we can unlock $10+ billion on just 10 acres [4 ha] of land, what can we unlock on 250 acres [100 ha] of land' (Khelsilem, 2023)?

Developing real estate has been a long-term plan for the Squamish Nation and the Nation creates political economic structures today for a financially-independent and prosperous future tomorrow. This, however, is based on the assumption that the political economy of real estate in Vancouver, that, as a city planner describes, 'relies on a rising housing market and the profits from that being invested into social goods' (Interview_B1), continues to function on that premise. Where real estate development holds the promise of financial prosperity and economic independence, it is also risky. Much can change over the time span of Seńákw's 120-year lease.

Seńákw forms part of what might be one of the biggest real estate development schemes in Canadian history (van der Haegen and Whiteside, 2025). The Vancouver region's First Nations are bound to become central actors in the system of capital accumulation through real estate that was initiated through col-

onization, bolstered by competitive advantages and governmental accommodation in the spirit of reconciliation. This is based on First Nations' own long-term ambitions in pursuit of their own urban futures (Mays, 2022). However, these ambitions are also exercised within the predominant political economy, and this signifies that sought-after urban futures are increasingly intertwined with the reproduction of the region's extractive real estate system (for details, see van der Haegen, 2025).

Conclusion: The dialectics of Indigenous real estate development

> I think there's something fundamental to this story, which is the Squamish Nation, which is a government and a community who has historically been disadvantaged, is actually going to benefit from this.
> *(Khelsilem, 2021)*

In her influential work on the gaming-operating Seminole tribe of today's Florida, Jessica Cattelino writes that for Seminoles 'poverty and wealth are closely tied to their analyses of colonial oppression' (2008: 98). By entering the casino business, Seminoles could multiply their annual budget 100 times over a time span of 20 years, from US$ 2 million to US$ 200 million (Cattelino, 2005: 190). Likewise, Squamish representatives have repeatedly stated publicly that central purposes of real-estate development are economic independence and the creation of revenue. Real estate is the most important business in the region and, as Sxwíxwtn/Wilson Williams, Squamish Nation spokesperson, subsumes: 'in the past, we were looking in windows just to be a part of things – we're now at the table' (Onishi, 2022).

In an extremely expensive housing market built on stolen Indigenous lands, fixing capital in real estate is the obvious choice when pursuing revenue, but the high-price environment that makes developments like Seńáḵw attractive financial investments also reinforces an extractive real estate system and structural unaffordability. That system is reproduced by all levels of government as they welcome the incorporation of Indigenous lands into circulation. Development is based on streamlining Indigenous lands with 'regular' investment environments thereby replacing First Nations' depen-

dence on the government with dependence on an expanding housing market. This not only creates business opportunities for large private sector actors, but it also resounds with conservative calls for Indigenous assimilation. An 'activist capitalist state' (Whiteside, 2020: 2), 'neoliberals and advocates for Indigenous self-determination do share some common ground' (MacDonald, 2011: 261) as First Nation real estate development comes to signify 'inclusion into the exclusionary structures of capital accumulation' (Wyly and Wilson, 2023: 5). In its current reconfiguration, the political-economic structures of the settler-colonial city allow for First Nations to be powerful future-makers, but that power is also exercised within these political-economic structures, and it is circumscribed by a broad actor coalition interested in ensuring 'the circuitry of capital' (Pasternak and Dafnos, 2018).

Therefore, emerging urban futures are neither predetermined nor completely open. Rather, their contingent nature arises from the dialectical relationship between historically grown settler-colonial structures and agency exercised in the present. To manifest these futures, the private property regime is expanded onto Indigenous lands to allow for capital accumulation through land-based assets. Nevertheless, this is no linear roll-out of the settler-colonial private property regime on Indigenous lands (Pasternak, 2015). First Nations are using land after their own analysis of how to navigate the structures of settler-colonial capitalism in pursuit of their own ideas about how to make the future. From a strictly political-economic perspective, this will afford them the prospect of an increasingly central position in the region's real estate business and substantial amounts of revenue that they might invest into their communities.

The dynamics analysed here escape easy categorization and underline the heterogeneous and contradictory nature of the settler-colonial city, in whose everchanging totality large-scale First Nation real estate developments emerge as new configurations of space. They signify the expression of broader capitalist dynamics in a unique, evolving context (Christophers, 2014) that creates culturally specific engagements with capitalism that are defiant of 'a paradox of [Indigenous] culture and economy' that has seemingly defined Indigenous identity (Cattelino, 2008: 205). This contribution shows that the emergence of First Nation real estate development is driven by First Nation agency from a positionality that is not of their own choosing, as much as that agency is circumscribed by the structural forces of settler colonialism. With that I do not wish to make a statement about what First Nations should or should not do, but I want to highlight that Indigenous agency and settler-colonial structures need

to be accounted for in their mutually constitutive nature beyond 'the denial of Indigenous co-presence with modernity' (Radcliffe, 2017: 223) for an improved understanding of settler-colonial urbanisms.

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5. From working-class cultivation to non-commercialized social interactions

The evolving social role of modernist public spaces in an Indian industrial city

Irina Redkina

Introduction

Modernist architecture and urbanism have often faced criticism for their perceived rigidity and failure to capture the complex dynamics of urban social life. They are frequently depicted as products of top-down control with little regard for lived experience (Jacobs, 1961; Tafuri, [1973] 1976; Scott, 1998; Sennett, 2010). However, recent scholarship on post-war urban modernism, recognizing the multiplicity of its initial aims and afterlives, seeks to nuance and decolonize such generalizations (Kulić et al. 2014; Swenarton et al., 2015; Kordas, 2018). This chapter contributes to this growing body of work by focusing on the public spaces designed in the early 1970s in Bokaro Steel City in line with modernist principles of urban planning. Bokaro, a planned industrial city in eastern India, was built in conjunction with the massive Bokaro Steel Plant – one of Asia's largest, constructed with Soviet support. Conceived as part of one of the largest national new town programmes (Glover, 2012: 108) and of a national social modernization agenda (Parry, 2020: 7–9), the city and its public spaces were intentionally designed by Indian urban professionals to foster an urban working-class model town and to shape patterns of collective life and citizenry in postcolonial India. In this chapter I demonstrate that the functionality of Bokaro's built environment endures amid the drastic socio-economic changes of the last decades. This interplay has led to contingencies in the social role these spaces play today.

Since the 1990s, Indian urban development has shifted towards neoliberal economic strategies, resulting in reduced state-provided social security and

greater autonomy for the public company managing Bokaro's land and facilities. Despite these market-driven reconfigurations, Bokaro's urban design has exhibited a notable resilience: The city's built environment has consistently adapted to provide essential public goods, especially to the city's vulnerable populations. In functioning as a social buffer, the city's originally planned environments mitigate today's inequalities brought about by neoliberal transitions. By focusing on the city's past and future urban development, this research repositions modernist urbanism as a dynamic legacy in the present-day urban landscape.

By analysing Bokaro's historical public spaces in flux, I explore how their social role has been changed: from sustaining the city's working-class character to providing space for affordable recreation and non-commercialized social relations. The contingency in the social role of these public spaces, I argue, is made possible by their enduring sociality. Amid significant socio-economic transformation and the rise of commercialized, exclusionary venues such as policed shopping malls, modernist public spaces no longer function precisely as their planners intended. Originally designed to cultivate an aspirational, forward-looking urban working class and foster collective sociality, these modernist public spaces persist in offering leisure as a public, collective good. Today, these older spaces predominantly serve those excluded from the city's commodified centres of consumption. While they may no longer epitomize the postcolonial future its planners once envisioned, these spaces have become refuges that maintain and reflect the city's working-class identity within a landscape increasingly dominated by neoliberal values and market-driven urban change. By analysing the evolving social role of Bokaro's historical public spaces, I argue that a remarkable robustness of the planned city's design has maintained Bokaro's ability to provide essential public goods, despite pressures from commodification and market-driven changes.

The empirical findings presented here challenge dominant critiques of modernist urban planning by showing that these historical urban structures are not socially static or exclusively geared towards control. Thus, instead of adopting the prevalent stance in mainstream literature, which views modernist urban planning as a 'top-down' enterprise judged in terms of success or failure (Tafuri, [1973] 1976; Scott, 1998) – and which is echoed by numerous scholars, such as Nandy (2003) and Roy (2007) in the Indian context – this chapter instead attends to the enduring elements and nuanced legacies of Bokaro's public spaces. It asks what forms of social relations were envisioned and produced through state-led modernist planning, and why. Further, it

explores how these social relations continue to inform the urban landscape and everyday life of Bokaro today. Hence, it offers new perspectives on how the built environment can inform urban landscapes in ways that go beyond the original intentions of political institutions.

My study takes inspiration from the philosopher Boris Groys (2019), who has argued that modernist developments operate primarily on the level of the material base – meaning the material, physical conditions and environments of society – rather than on the superstructure level, that is, the abstract ideas and cultural narratives constructed upon those material foundations. Consequently, this analysis delves into the material structures of Bokaro, tracing their evolving social roles over time. To theorize these shifting dynamics, I draw on Henri Lefebvre's concept of 'social space', which foregrounds the ways in which urban spaces are produced and continually transformed through social relations and historical processes. 'Social space' is a historical social form, a product or a work of a certain social formation (Lefebvre, [1974] 1991: 412; Ahuja, 2009: 25–26), a set of relations that inherently echo the social interactions of different groups. The concept underscores that space is never empty or neutral but both produced and re-produced (Lefebvre, [1974] 1991: 36). Unlike natural spaces, social spaces, according to Lefebvre, are deeply intertwined with social relations, property relations, and land control mechanisms (Ibid.: 81–85) – an observation which will be crucial for our analysis. Lefebvre underlined the importance of material reality (ibid.: 68–77), which, despite being remoulded and transformed under changing urban realities, never disappears completely (ibid.: 164–65, 229, 412). Historically contingent social space therefore cannot be completely eliminated, even by the most powerful players. Forms, functions or other elements will necessarily persist: 'no space disappears in the course of growth and development' (ibid.: 86). As spaces evolve, they adapt to contemporary pressures yet still embody their historical contexts, as noted by thinkers such as David Harvey (1990). This conceptual lens provides us with a comprehensive understanding of how past urban future-making affects the present urban landscape.

This socio-historical analysis of Bokaro's space is grounded in ethnographic research conducted over two months of fieldwork in 2023. That work allowed me to contextualize concepts and practices of public spaces, urbanism, and modernism. The necessity of a historical approach to ethnography, which involves not only field observation but also in-depth exploration of the city's historical narratives and material landscape (Low, 2017: 36–38), soon became evident during the fieldwork. A historical perspective was present

in key documents on Bokaro's public spaces, such as the General Plan of the City (1969–70), the Master Approach Plan (1974), and photographs from 1997 – all provided by Dipankar Das, the former deputy general manager in the Architecture and City Planning Department at the Steel Authority of India Limited (the public company responsible for Indian steel production, hereafter SAIL). The 2023 fieldwork combined participant observation, semi-structured interviews, photography, and field notes to collect information on the current state of public spaces and was enriched by conversations with site workers and visitors.

In the next section, I explore the broader debate over the interplay between architecture and political power, with a particular focus on whether material structures can maintain social traits even after the political frameworks that created them vanish. Following that, I analyse the implicit and explicit ideologies embedded in Bokaro's historical design and its public spaces, seeking to uncover the intended social interactions the urban space was meant to foster. I then discuss how public spaces served as cornerstones of Bokaro's social agenda, then continue by examining their social performance today and investigating their evolving social role in the current urban conjuncture. Subsequently, I analyse the contingencies of the social functionality in Bokaro's public spaces, highlighting unexpected ways in which these environments continue to inform the city's landscape. I also discuss how Lefebvre's notion of social space contributes to understanding the endurance and transformation of Bokaro's historical built environment amid shifting political-economic conditions. Finally, I conclude with a discussion of the evolving social role of historical public spaces over time, in juxtaposition to influential critiques of modernist urban planning.

Beyond political scaffolding: The enduring rationales of the modernist built environment

In the post-World War II reconstruction era, planned industrial cities were widely viewed by governments as blueprints for the future and vital instruments of desired social transformation (Alexander and Buchli, 2007). The so-called new town movement emerged as a prominent urban planning strategy in the mid-20th century and was characterized by the proliferation of entirely new urban settlements on previously undeveloped sites, often built according to comprehensive plans and with intended social, economic, and

architectural goals. Its settlements, as efforts to address rapid urbanization, housing shortages, and social reform, embodied the promise of universal progress and modernist ideals, including affordable housing, equal rights in urban spaces, spacious planning, integrated sanitation, functional spaces, and ample green areas. The movement's 'golden' age is generally seen as spanning from 1945 to 1975 (Wakeman, 2016: 1), a period during which planned towns became a favoured solution across continents (Strange, 2019; Crimson Historians and Urbanists, forthcoming).

A robust body of criticism has challenged the premises and outcomes of state-led urbanism. Early on, Manfredo Tafuri's influential *Architecture and Utopia* (Tafuri, [1973] 1976) argued that the utopian aspirations of modernist urban design would inevitably become entangled with the logics of capital and state power, portraying modernism's social optimism as a naive attempt to solve social problems, detached from historical and political-economic realities. Similarly, Henri Lefebvre, in *The Urban Revolution* ([1970] 2003) and *The Production of Space* ([1974] 1991), critiqued both capitalist and state socialist urban planning for their faith in rationally ordering social needs into neatly segregated spatial functions (Stanek 2015, 121; Lefebvre, [1974] 1991: 55). Lefebvre's perspectives aligned with contemporary French theorists such as Michel Foucault, who considered state-led urbanism as a tool of social control (Stanek, 2015: 125). These foundational critiques informed later post-structuralist analyses, most notably James C. Scott's *Seeing Like a State* (1998), which argued that modernist planning prioritized legibility, efficiency, and administrative order over the complexity of lived urban experience, often resulting in rigid and inflexible urban spaces. According to Michael Kordas (2018), this dominant critical perspective paints post-war modernist planning as rigidly technocratic and socially disengaged, a view that continues to influence both scholarship and public discourse regarding the shortcomings of modernist urbanism.

A key assumption in this critical debate is that modernist urban products were primarily vehicles for state power, and therefore often viewed by scholars as a political representation, prioritizing control over social vitality and therefore holding little contemporary relevance. As Nick Beech insightfully concludes from analysing scholarship on modernist urbanism, dominant accounts often frame the state as operating outside and above both polity and architecture, with architecture serving merely as a neutral 'medium that the state can mobilize' for its aims (Beech, 2014: 196). Other recent studies also view these dominant accounts as reductive. Rather than seeing the modernist built

environment as simply mirroring political influence, the studies argue that architecture should be seen as an active instrument of social modernization and power, deployed to physically construct and periodically reproduce certain social systems (Molnár, 2013; Beech, 2014). This line of research calls into question the assumption that modernist material structures are secondary to political institutions, instead highlighting how the former can facilitate the spatial reproduction of specific social relations even after the political structures that produced them have vanished.

To analyse the social role of modernist architecture, it is essential first to understand what constitutes its social dimension. Numerous historical studies have investigated the social relations embedded in modernist urbanities and planned cities around the globe. Architectural historians have provided nuanced readings of developments in architectural form and practice in, for instance, the former GDR, Czechoslovakia, and Hungary, highlighting the intricacies of state-led urban housing projects (Zarecor, 2011; Molnár, 2013). The ambitions of the UK's new towns to unite social classes and create balanced communities, along with the relationship between the built environment and the welfare state, have long been examined in critical scholarship (Heraud 1968; Frampton 1985). After a long hiatus, the relationship between the welfare state and the built environment in Western Europe has only recently been re-examined, marking a significant scholarly return to this topic (Swenarton et al., 2015). Complementing these perspectives, studies have also investigated the development of a small working-class city near Detroit, with well-equipped housing for Ford factory workers (McCulloch, 2023). Collectively, these studies illustrate the global endeavour to embed social considerations within a historical understanding of modernist urban planning.

The debate over the contemporary relevance of modernist built environments, particularly of planned cities, has become a subject of growing scholarly interest, especially in post-socialist urban studies. Despite the dissolution of the political institutions that founded state socialist cities, the built environment of these cities continues to significantly impact the contemporary urban landscape, as scholars such as Kimberly Zarecor (2012), Felix Ringel (2014) and Michał Murawski (2019) have demonstrated. Their studies highlight how built socialism was and continues to be lived, offering resilience against capitalist encroachments while preserving original social and spatial functionalities. Similar findings are echoed in studies of the modernist planning legacies in small towns located in the UK, the Netherlands, Vietnam, and elsewhere, highlighting how the historical built environment continues to play an impor-

tant role in the urban social fabric amidst dramatic changes in socio-political landscapes (Beech, 2014; Ortolano, 2019; Schwenkel, 2020; Chevalier and Tzaninis, 2022).

Studies on the legacy of modernist urban planning in the Indian context also add significant contributions to our understanding. Nehruvian projects, for example, face criticism for being political status symbols that glorify industrial gigantism over local realities. Srirupa Roy (2007: 150) critiques the abstract vision of Indian steel towns, while Ashis Nandy (2003) notes that planners' fascination with modernity led to an erasure of cultural differences and the production of infrastructures misaligned with India's social conditions. However, grounded, bottom-up perspectives unveil the social rationales behind these cities' designs. Jonathan Parry's anthropological study on the steel town Bhilai suggests the township serves as both a social and economic project (Parry 2020: 7); he emphasizes its cosmopolitan core and role in blurring distinctions between officers and workers (ibid.: 76–103). Anthropologist Christian Strümpell's (2023) research on Rourkela, another steel town, provides valuable insights into everyday urban life and its social differentiation between the public company's regular employees, who enjoy job security, and other workers in the area. Revealing the historically contingent relationships between urban living, ethnicity, and caste in Rourkela, Strümpell emphasizes the socially contested nature of the city's space. He also highlights the transformation of former farmers into modern workers, significantly shaping Rourkela's social landscape (2013). Adding to this, architect Ali Saad (forthcoming) views Rourkela as a city with diverse social modernization goals. Together, these studies underscore the distinct social rationales underpinning the urban planning of these Indian townships.

In conclusion, while mainstream literature frequently dismisses postwar modernist urbanism as socially inadequate, a growing body of empirical studies has examined the social character of the modernist built environment across diverse geographical and political contexts. The research presented here contributes to this scholarly endeavour by offering a case study of modernist urban planning in an Indian peripheral industrial city, further enriching our understanding of modernism's living legacies.

Urban futures of the past: The history of urban design and planning in Bokaro Steel City

Bokaro Steel City stands as a prime example of a planned industrial new town where architecture and urban planning were leveraged by the Indian government to initiate radical social transformations. Between 1947 and 1981, India established 118 new towns – one of the world's largest new town programmes (Glover, 2012), alongside those of the Soviet Union and the United Kingdom. This initiative formed part of a broader movement towards Indian decolonization and social modernization, aimed at creating a technologically advanced and modern nation with economic autarchy (Prashad, 2008: xvii–xviii; Shaw, 2009). Efforts extended beyond town construction and also included the development of public-sector research institutes and heavy industries (Glover, 2012; Pathak, 2019). Among the most iconic urban developments symbolizing these aspirations was Chandigarh, designed as a capital city. However, the majority of new towns, like Bokaro, were industrial settlements (Glover, 2012). Strategically located in remote regions, these planned industrial towns sought to integrate peripheral areas into the Indian state, promoting modernization through urbanization and industrialization (Shaw, 2009; Glover, 2012). They aimed to transform 'tribal' populations into a modern urban workforce for the newly independent state (Strümpell, 2013).

Bokaro Steel City, in the eastern Indian state of Jharkhand (before 2000, the southern portion of Bihar), was part of this social modernization agenda. Bokaro and similar planned steel towns of that period were each established adjacent to large steel facilities built with support from foreign countries – the Durgapur, Rourkela, and Bhilai plants by the UK, West Germany, and the Soviet Union, respectively. The Bokaro Steel Plant was also constructed with Soviet aid, often leading to misconceptions that Bokaro's urban design closely followed Soviet town-planning practices (Strange, 2019: 319–37). However, as shown elsewhere (Redkina, 2025), Bokaro's design was distinct from both Soviet and Western planned cities, particularly in its approach to social inequality. While influenced by the international modernist new town movement's principles, Bokaro's planning also reflected local contextual factors – most notably, India's distinct political economy and Bokaro's role within the country's postcolonial nation-building agenda. Rather than seeking to eliminate class differences – as Soviet urban design aimed to do (Cera and Sechi, 2020) – Bokaro's design aimed to mix up classes within the new urban fabric.

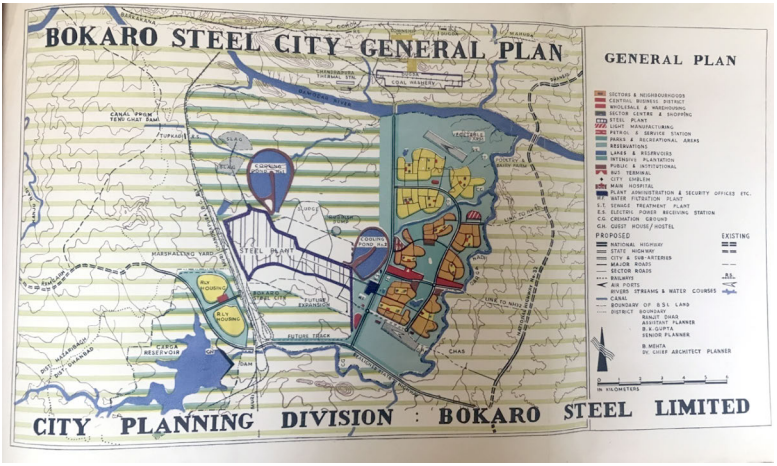
Bokaro's urban design incorporated modern planning principles aiming to provide the working class with a solid material foundation for a decent life. Initiated in the 1960s, the Bokaro Steel City Architecture and City Planning Department identified key concepts and spatial hierarchies to achieve this vision (Bokaro Steel Limited, n.d.: 10). A central idea was the 'Primary and Secondary School District Concept', which organized the city as a whole through a hierarchy of self-contained neighbourhoods and sectors. At the neighbourhood level, 100 to 150 dwelling units were grouped around a primary school, green space, and local shops, creating a 'village-like' setting designed to foster community and facilitate a smooth transition for people moving from rural areas (Glover, 2012: 124). Several neighbourhoods formed a sector, and multiple sectors made up the city.

This three-tier system structured community life around educational and social infrastructure, while a well-defined transport network connected the different levels. As alluded in the name of the concept, schools were central, with each neighbourhood featuring a primary school and each sector containing two secondary schools, alongside parks, local shops, nursery schools, and tot lots. In addition, each sector included other essential facilities such as health centres, post offices, religious and cultural institutions, police stations, and sports playgrounds (Bokaro Steel Limited, n.d.: 19). Large facilities, such as Bokaro General Hospital or City Park, were strategically administered at the city level. This nested hierarchy of social facilities demonstrated a socially oriented model of urban development, aiming to foster a sense of community through the provision of well-equipped shared public spaces. Intensive construction based on the General Plan took place in the 1970s, with further developments continuing in the 1980s. The city's construction largely adhered to the original plan; the implementation of smaller modifications over the years was outlined in appendices.

Bokaro's design, as seen in the General Plan (Figure 1), aimed to integrate workers from different income levels within shared residential spaces. Housing for different income groups was intermixed within each sector (Redkina, 2025). This incorporation of mixed-income housing within a single sector was a crucial aspect of the housing scheme, intended to encourage families from various income backgrounds to interact and share public spaces, shops, parks, and community centres (Bokaro Steel Limited, n.d.: 21–24). Notably, in an effort to set up a model town with a standard of accommodation surpassing the national average, each housing unit was equipped with electricity, running water, indoor toilets, and kitchens (ibid.: 37–43), providing a superior quality of

housing by Indian working-class standards at the time (Parry, 2020: 92). Unlike simply constructing a plant and hiring local villagers, the Indian government thus aimed to make Bokaro as a model of an alternative way of living.

Figure 1: The general plan of Bokaro Steel City, highlighting the relational location of various facilities within the city, and the city's proximity to industrial facilities.



Source: Bokaro Steel Limited, General Plan, ca. 1969–70. Courtesy of Dipankar Das.

Bokaro's historical design stands out in the landscape of Indian urbanism for its extensive level of state involvement and reliance on public-sector initiatives, reflecting the city's social role as part of social modernization effort in the early postcolonial country. Bokaro was designed as more than a provider of an industrial workforce; it was envisaged as a model city for a modern urban working class, in line with Nehruvian ideals of social equity and economic development (for additional maps and images, see Redkina, 2025). This commitment necessitated a complex relationship between the state, the public company, and urban governance. Land was compulsorily acquired from local peasants by the central government, then transferred to the state of Bihar (now Jharkhand) and subsequently subleased to SAIL, which continues to manage the land to this day. SAIL was responsible for overseeing the city's construction and governance, as well as managing social infrastructure such as schools, nurseries, and a hospital, alongside the industrial plant (Steel Authority of In-

dia Limited, 2012). In carrying out these tasks, SAIL primarily implemented the government's social and urban objectives, thereby maintaining the state's overarching authority.

In sum, Bokaro aligns in many ways with the broader global new town movement by embracing master-planned urban development, rational spatial organization, and a focus on collective social infrastructure – principles rooted in modernist planning across Europe and beyond. However, Bokaro is also marked by distinctly Indian and postcolonial features: a mixed economy combining state and public enterprise with private initiatives; the specific imperative of constructing a new national identity in the aftermath of colonialism; and distinct ways of mixing classes (for more details see Redkina, 2025). Ultimately, Bokaro stands as a unique experiment, synthesizing international models of planned development with India's particular socio-political context and state-driven aspirations.

The historical design of Bokaro's public spaces

To trace the historical design and development of Bokaro's public spaces, this research has drawn on a range of sources: the city's General Plan, dated from ca. 1969–70; an interview with Dipankar Das (an architect from the Architecture and City Planning Department who has resided in Bokaro since 1980); interviews with senior city library staff; and conversations with long-time residents. Together, these perspectives provide a nuanced account of how public spaces in Bokaro were envisioned, produced, and experienced in its initial decades, before the major socio-economic changes of the 1990s.

As evident in the maps of the General Plan, public spaces were central to Bokaro's design, as they were supposed to foster a sense of well-being and belonging in this new and remote town. Community facilities – educational, medical, retail, and recreational – were discussed in as much detail as housing and utilities such as electricity lines or sewerage (Bokaro Steel Limited, n.d.: 29–32). This emphasis on public spaces was intrinsically linked to the aspiration of cultivating a vibrant community life within the city – a goal that K. M. George, SAIL's managing director of that time, identified as fundamental to Bokaro's development: 'For harmonious working conditions, an integrated steel plant requires an integrated community life for its employees. To achieve this, a new town with all the facilities has been designed for the employees of Bokaro Steel Limited so that they have not only job satisfaction

but also full life satisfaction' (ibid.: 8). Additionally, this approach reveals that residents were regarded not simply as consumers or passive recipients of services, but as an essential workforce whose needs for relaxation and fulfilment were integral to the city's planning – needs to which the city was both obliged and committed to address.

Leisure and cultural spaces, central to the discussion in this chapter, are addressed in the General Plan through concepts of 'recreation' and 'shopping' and were integrated into the three-tier system of neighbourhood, sector, and city levels (ibid.: 18–19, 22–23). Neighbourhoods included children's playgrounds, toddler areas, and feeder parks that served as green buffers within residential blocks. Sectors contained local shops for convenient access to basic groceries, and most importantly, community halls. The latter, a vital part of the urban model, were eventually built in six out of ten residential sectors. Designed to align with the Nehruvian model of secular India, the community halls were non-religious and meant to foster interaction among diverse groups. They offered indoor game rooms, libraries, and areas for activities such as workshops or teenage gatherings, as well as outdoor sports areas with programmes for the well-being of both teenagers and adults (ibid.: 32). As residents shared with me, they could organize workshops or schedule meet-ups in the halls. Considering that an income-mixing housing scheme was also integrated on the sector level, these halls were important in bringing together people from different economic backgrounds through shared social activities. Additionally, each hall featured a library corner, offering a quiet study space or opportunities for study, rest, and learning. One interviewee, now a researcher in New Delhi, recalled how a community hall library enabled him to access books from different countries, which was of great interest to him as a child. Older residents I talked to remembered these library corners as peaceful retreats away from home.

There were also larger recreational facilities, generally situated closer to the city centre, as there was typically one large facility of each type available for the whole city. Expansive green spaces formed a defining feature of Bokaro's urban landscape from its earliest stages of development, reflecting a wider trend in modernist city planning. Since Bokaro was to be developed in several stages, the General Plan, dated ca. 1969–70, provided details for land use for the first stage only: 505 hectares out of 1255 were allocated for public green areas, such as city parks, feeder parks, and other open spaces, representing 40.2% of the area (ibid.: 20). This early focus on green zones was also reflected in a 1997 pre-

sentation by the Architecture and City Department of Bokaro[1] delivered by Dipankar Das, who served as an architect and town planner at the department from 1980 to 2013.

Figure 2: An arched bridge to the island in City Park, Bokaro Steel City, November 2023.

Source: Author.

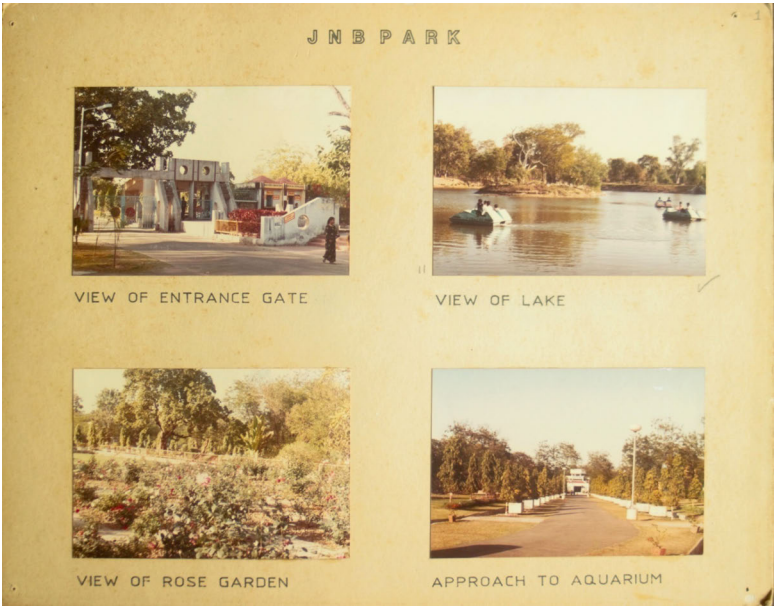
The presentation included a slide about the city's forests, underscoring their continued importance. I accessed a collection of old films and photographs capturing the beauty of City Park, established in the 1970s as a central recreational hub. Designed with gardens, lakes, and islands connected by arched bridges, the park featured rose gardens, palm trees, and pavilions providing shaded spots for relaxation. A large stage hosted significant city events, making the park a focal point for community gatherings. The park

1 The presentation, held at the University of Ranchi, focused on the development of Bokaro as an industrial city, a unique phenomenon in the region. The largest city near Bokaro, Ranchi became the capital of the newly formed state of Jharkhand in 2000.

also offered boating facilities on its large lake, as well as several restaurants, enhancing its social and recreational appeal. Based on photographs and residents' accounts from the 1980s and 1990s, the park was indeed impressive compared to parks in other Indian cities I have seen.

Another major green area, the Jawaharlal Nehru Biological Park, completed in 1989, was the last public space designed and constructed by SAIL. Being one of the largest gardens in the state of Bihar (now Jharkhand), it showcased rare flora and fauna (Steel Authority of India Limited 2012: 48) accompanied by informative signage, earning its reputation as a zoo. Even today in the park, one can still see old information posts about the animals and plants found there. Thanks to its size, the park also offered a tranquil escape from urban noise. Additionally the zoo's attractions, according to the above-mentioned films, included rose gardens, a miniature train, and the Jal Jeev Vihar aquarium, which displayed posters of aquatic life.

Figure 3: The Jawaharlal Nehru Biological Park (zoo), Bokaro Steel City. Presentation card (analogue photographs mounted on paperboard), 1997.



Source: Courtesy of Dipankar Das.

The city's extensive green venues were complemented by cultural venues. Bokaro's cultural infrastructure, which included community halls, was enhanced by the Central Library, near the city centre. Opened in 1974, this well-lit, multi-storeyed building with modern amenities symbolized the city's commitment to community and secular development. The library, though recently renovated, still retains its original layout, with separate study spaces and an old but vast collection of books in multiple languages. Several older residents recalled that it regularly hosted events for school students, such as book fairs or reading games. Addressing an image of the urban working class, these efforts aimed to lay the foundation for a more informed and affluent modern society. Additionally, three modern cinemas offered further entertainment options, enriching Bokaro's robust cultural landscape.

Figure 4: Central Library, Bokaro Steel City, November 2023.

Source: Author.

Bokaro's urban planning is generally oriented on merging classes, yet two clubs were notable for an early exclusionary nature: the Bokaro Club and the Russian Club. The Bokaro Club was discreetly located near the Bokaro Hotel – which primarily catered to high-ranking guests meeting the plant's and city's top executives. The club offered a conference room, concert hall, and rooftop

bar-restaurant, but these did not serve the general public. The Russian Club, located in a residential area for the Soviet technical specialists posted to Bokaro to build the steel plant, primarily functioned as a cultural centre for the Soviet delegation and Communist Party of India members. It only occasionally opened for public screenings and monthly events, where labourers and executives gathered with their families to watch films. Both clubs were largely inaccessible to the lower classes. This highlights a key aspect discussed earlier about Bokaro's urban planning: The city's design did indeed promote social mixing in many public spaces – where people from different backgrounds were brought together by the necessity of social activities – yet it also preserved exclusive venues for the upper classes, where such interaction was not required, thus preventing the total elimination of class differences.

Figure 5: Bokaro Club, Bokaro Steel City, March 2023.

Source: Author.

To conclude, in the 1970s and 1980s – still the early decades of post-Independence – when many Indian cities lacked entertainment infrastructures (Athique and Hill, 2010: 30), Bokaro stood out by offering abundant green spaces, cultural amenities, and leisure facilities. This approach aimed to at-

tract qualified professionals to the remote location (Pande and Kumar, 2021: 185) and ensure a high standard of living for public-sector workers – the majority of the planned town's population. Rather than establishing a classless society, Bokaro's urban design aimed to facilitate promoted coexistence and social engagement, reflecting the early post-Independence vision of fostering community and well-being in a city of national significance.

Evolving social functionality of modernist public spaces: Preserving the working-class fabric amid commodified logics

Beginning in the 1990s, Bokaro experienced a profound socio-economic transformation, shaped by broader geopolitical changes and nationwide shifts towards market liberalization. These changes departed from a state-led Nehruvian social contract and moved to neoliberal economic strategies (Patnaik, 2007; Patel, 2022). Indian cites were reimagined from places of use-value designed as decent places to live and into investment opportunities for private capital (Fernandes, 2004). As state provision and social security diminished, SAIL – according to its management – found itself without government support while continuously being burdened by high labour and social infrastructure costs (Pande and Kumar, 2021: xii, 35). In response, SAIL redefined its role from a national benefactor to a more profit-oriented entity (ibid.: 185), reducing its workforce significantly: from about 50,000 employees in the 1990s to 16,467 by 2015 (Strange, 2019: 336). SAIL also ceased its active role in Bokaro's urban development. Since 1989, after delivering the last major state-sponsored project, the Biological Park, SAIL has shifted to primarily being a landowner, inviting private investment in sectors like real estate, entertainment, and hospitality. Private investors have since established art centres, educational facilities, and upscale restaurants and cafés. These changes have profoundly impacted Bokaro's urban landscape, particularly in leisure and cultural activities, challenging Bokaro's original vision as a hub for social reproduction rooted in Nehruvian modernist ideals.

The two new major landmarks in Bokaro, the Bokaro Mall and the Hindu temple Jagannath Mandir – built in the last decade by Chinese and Indian investment respectively – exemplify this trend. The Bokaro Mall symbolizes middle-class consumerism and offers, for the most privileged, a controlled retreat from the city's hustle, whereas Jagannath Mandir indicates a move towards ethno-nationalization and privatized religious spaces. Unlike histor-

ical public spaces, these new spaces are more exclusive, defined by purchasing power and religious affiliation. Additionally, government mandates on corporate social responsibility (CSR) – requiring companies to support social, environmental, and economic development – have notably shifted responsibility for social well-being from the state to private entities. In Bokaro, CSR is exemplified by projects like the Bokaro Handicraft Training Centre – where rural women in economically challenging situations learn to craft and sell bamboo products, promoting small-scale entrepreneurship as a solution to economic challenges. These new spaces are markedly different not only in their sociality, but also their materiality. The well-lit, shiny, and meticulously maintained environments are purposefully designed to contrast with the functionalist and practical nature of the past. Overall, these new developments prioritize individual responsibility for social and economic life, selective social engagement, and leisure through consumption.

Today, Bokaro's historical public spaces exist within a shifting political and material context, shaped by an unforeseen restructuring. While modernist urbanism and its built environment are often criticized for their top-down approach and supposed social inadequacy, little attention has been paid to the evolving role of these spaces under current market conditions. This research argues against simply dismissing these historical spaces and the broader Nehruvian agenda that produced them. It draws on Lefebvre's understanding of social space – which emphasizes the interplay of 'conceived' (planning concepts and ideologies), 'perceived' (built forms), and 'lived' (everyday practices) dimensions (Lefebvre [1974] 1991: 38–39) and contends that *'no space disappears in the course of growth and development'* (ibid.: 86) but instead accumulates historical layers that shape present dynamics (ibid.: 164–65, 299). Lefebvre therefore suggests that social spaces are shaped by these layers, as well as by property relations and land control (ibid.: 81–85). This perspective is especially valuable in Bokaro, where the relationship between the built environment, state ownership, and the public company creates a complex interplay between historical legacy and contemporary urban dynamics.

In Bokaro, the persistence of state ownership and of the social functionality of parks, libraries, cinemas, and the zoo – still owned by SAIL – underscore the endurance and resilience of the city's modernist ideals. Today Bokaro's built environment shaped by these Nehruvian modernist ideals remains largely intact. Unlike many other industrial towns where public spaces have been commercialized or converted into heritage sites, Bokaro's historical amenities have largely retained their original roles, with only minimal material changes, such

as signs of neglect or renovation. Thus, the city's public spaces exhibit remarkable consistency in their public ownership and social function despite market-driven pressures since the 1990s. What has changed is the broader urban landscape in which these spaces now operate, and the social role they now play, redefined in response to contemporary economic and social realities.

Bokaro's cultural landscape has shifted with the rise of multiplex cinemas and digitalization, which challenge the roles of older cinemas and libraries. Multiplexes now offer luxurious movie experiences with plush seating and fresh popcorn, making them exclusive due to pricing. This shift has impacted the traditional cinema scene: One of the three old cinemas has closed, while two – Jitendra and Pali Plaza – remain, today primarily serving low-income audiences who cannot afford the multiplex experience. Being located in the city centre and offering the same movies but at lower prices, these cinemas ensure that cultural participation remains affordable; this could be interpreted as *resistance to the* commodification of leisure, upholding cinema as a public good for a broader number of workers, rather than a luxury, and serving as class-balancing space.

The Central Library has also transformed, moving from a bustling community hub to a quieter study space. It now focuses more on subscriptions to regional and national journals than on expanding its book collection, resulting in an outdated and disorganized catalogue. Competing against new private libraries offering modern amenities like wi-fi and air conditioning but for higher fees (400 rupees per month), the Central Library remains financially affordable at a nominal cost (60 rupees per year). The library continues to privilege SAIL employees, providing them with membership immediately, whereas other people must acquire a sort of recommendation letter from a SAIL worker. Therefore, the library leans to historical social hierarchies rather than adapting to market-driven hierarchies. This reflects both the persistence of collectivist spatial legacies and the broader challenges facing public infrastructure under market pressures.

Significant changes have occurred at the neighbourhood and sector levels, as these areas have not consistently received financial support from SAIL. Many green spaces and playgrounds have been neglected and are now overgrown with greenery. Community halls, once central to the social mediation between classes, have nearly disappeared in favour of private venues. In the mid-1990s, the community halls became popular for private weddings and events due to their ample indoor and outdoor spaces. However, new private wedding venues catering to more glamorous tastes soon overshadowed them.

As SAIL scaled back support, funding for community hall activities dwindled, resulting in their decay and the closure of all six community halls by the late 2010s. Currently, the community centre in Sector III is undergoing a revival, with new facilities such as a tennis court, football field, and numerous indoor rooms, including a stage. This reflects a potential renewal phase for community spaces in Bokaro, but the actual results are yet to be seen.

Figure 6: The Jal Jeev Vihar aquarium, reopened in 2023 after renovation, in the Jawaharlal Nehru Biological Park, Bokaro Steel City, December 2023.

Source: Author.

The Jawaharlal Nehru Biological Park (JNB) is the standout success among Bokaro's historical public spaces. It is exceptionally well-maintained, with manicured lawns, gardens, and an improved children's area. Recent renovations, like the reopening of the Jal Jeev Vihar aquarium, have enhanced its appeal. JNB hosts events such as Wildlife Week, Environment Day, and Animal Welfare Days, attracting families despite a declining animal population. Its

remote and expansive location offers a peaceful escape from urban noise. According to the 2016–2017 park report, JNB is financially sustainable, with support from entrance fees and revenue from photo and film shoots, reflecting a focus on profitability that enables continued renovations. Unlike the Town Administration–managed City Park, which shows signs of neglect, JNB operates under SAIL, with dedicated oversight.

City Park, an important green area in Bokaro, today continues to serve as a vast, open-access green space with free entry; it has not been upgraded, has aging infrastructure and overgrown gardens, and is only slightly maintained. Yet the park retains its role as a central locale with picturesque lakes that draw visitors for walks and picnics, especially during winter. Some previously accessible areas, like the islands and rose gardens, are now gated, restricting access and leaving visitors to view them from behind fences.

Figure 7: A closed gate to a bridge and an island in City Park, Bokaro Steel City, November 2023.

Source: Author.

Nevertheless, no major privatization or commercialization has taken place in City Park: There are no upscale cafes or restaurants marketed to higher-income groups, and visitors – as my interlocutors describe – continue to use the space as in earlier years, gathering for casual recreation and leisure. In this sense, City Park's persistence as a freely accessible space demonstrates a form of resistance to the enclosure and monetization of urban public spaces; residents' right to leisure and nature survives, however tenuously, against the logics of profit and pressures of contemporary urban transformations.

In summary, by the selective maintenance and upgrading of existing public facilities – neither commercializing them nor, since 1989, building new public facilities – SAIL acts primarily as a landowner and steward of the older social arrangements rather than as a developer. SAIL's commitment to public ownership and basic facility maintenance has been critical in preserving the original design and functionality of these spaces. Continuity of public ownership has kept the focus on visitors as residents, not dividing them based on their financial means. Leveraging Lefebvrian dialectics, as interpreted by Ahuja (2009: 30), these urban spaces embody historical social arrangements and actively reproduce the social dynamics initially embedded during their production – such as collective use, state stewardship, and public accessibility. These continue to be reflected in the way these spaces are conceive and perceived today.

Past visions, present realities: Conclusion

As the editors of this volume observe, contingency is based on the notion that nothing remains permanently fixed or unchangeable. It represents not only a condition of uncertainty but also an openness to unpredictable and plural futures. Even seemingly solid material structures, such as those from the last century constructed from concrete and an ambitious social vision, remain subject to reinterpretation and adaptation as urban realities evolve. This is evident in Bokaro's parks, libraries, and other historical public spaces, which were initially designed to foster an integrated and exemplary working-class community for a postcolonial nation. The role of bringing together people from different backgrounds has largely diminished. Over time, their social role has shifted: Today, these spaces provide vital infrastructure for residents who are excluded from the city's proliferating commercialized entertainment venues. Unlike the newly appeared privatized venues, where social interaction is commodified, Bokaro's historical public spaces have retained their collective and

inclusive character. Conceived as state-driven models for a postcolonial, inclusive future – embodying the ideal of leisure as a public good – these spaces now provide rare opportunities for accessible recreation. This stands in sharp contrast to the exclusive experiences offered by Bokaro's privately developed leisure venues.

This research has demonstrated that the social roles played by Bokaro's historical modernist public spaces are fundamentally contingent, shaped by the evolution of both the built environment and urban narratives. These empirical findings can be fruitfully interpreted through Henri Lefebvre's concept of social space. As Lefebvre argues, space is not a natural or neutral backdrop (Lefebvre [1974] 1991: 26, 30, 36); rather, it is actively produced through social relations and arrangements (ibid.: 36, 412). His dialectical understanding of social space suggests that no social space ever fully disappears, but each, instead, retains enduring forms and functions even as it is reshaped by new social forces (ibid.: 164–5, 229, 403, 412). Drawing on this perspective allows for a critical analysis revealing how spatial arrangements persist and evolve over time, shaping both contemporary and future urban landscapes. Therefore, the modernist forms and functions built under Nehruvian ideals, produced through particular social relations, endure through the 'conceived' and 'perceived' elements of the built environment.

However, within the changed urban landscape, this endurance appears to inform the contemporary social landscape in an unexpected way: serving for those excluded by the new urban order. Far from fading into irrelevance, Bokaro's public spaces function as dynamic social agents in the present, while remaining products and co-producers of evolving social relationships (ibid.: 38–39). Grounded in a socio-historical understanding of urban spaces as deeply embedded with historical layers, property relations, and land control (ibid.: 81–85), this chapter argues that Bokaro's historical public venues continue to play a prominent role in the city's social urban landscape. Central factors contributing to the social endurance of Bokaro's historical public spaces, as this study suggests, are the continuity of their public ownership and their persistent social functionality. Yet, as political and material contexts have changed, so too has the social role of these spaces.

This contingency underscores that the persistence of the modernist built environment allows these spaces to remain relevant in an increasingly polarized urban landscape. The evolving contributions of older modernist structures challenge narratives that dismiss modernist planning as inherently inflexible or inadequate, as suggested by Scott (1998) and Sennett (2010) – and

reiterated by Roy (2007) and Nandy (2003) in the context of Indian planned towns. Instead, as this ethnographically grounded study has demonstrated, Bokaro's historical public spaces function not as static relics but as active components of urban life, maintaining their commitment to collective use and social integration.

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6. The elementary forms of future-making

Sacrality and contingency at Hamburg's building exhibition

Louis Volont

Introduction

With the onset of secular modernity, the future opened up. No longer the outcome of divine determination, the future came to be seen as a realm malleable to human desire: It became, indeed, contingent. The historian Reinhart Koselleck (2004) captured this shift powerfully in his seminal book *Futures Past*. As the authority of Christian dogma receded in 18th-century Europe, what people experienced in the past (the 'space of experience') ceased to determine what would happen in the future (the 'horizon of expectation'). Futures scholars Barbara Adam and Chris Groves (2007: 89) made a similar point in their *Future Matters*. 'By the time the idea of progress had taken hold, people rather than their gods were in charge of the future', they wrote, immediately adding that 'with this shift in ownership, the future became a social rather than a sacred domain'. Raymond Williams (1973), finally, showed in his largely overlooked *The Country and the City* how the waning potency of Christian narratives of apocalypse and salvation opened the way for humanistic visions of urban futures to take root. In sum: As modernity desacralized, the future became a contingent construct.

Or so the prevailing narrative suggests. In this chapter, however, I propose that whilst the future did indeed become contingent in secular modernity, the sayings and doings of urban future-makers continue to resemble religious praxis. To make this point, I draw inspiration from Émile Durkheim's (1912) sociological classic *The Elementary Forms of Religious Life* and from the 'sociology of the sacred' that emerged in its wake (Alexander, 2003; Giesen, 2006; Lynch, 2012a). Central to this tradition is the claim that secularization does not render 'the sacred' obsolete. Instead, 'the sacred' is understood in Durkheimian soci-

ology as that which holds high moral value for social actors, while its opposite, 'the profane', names that which threatens, endangers, or metaphorically pollutes the sacred. Furthermore, essential to the Durkheimian gaze is the argument that social actors' engagements with the sacred and the profane emerge during times of 'collective effervescence', a term which refers to those periods in social life when the usual limits to thought and action are temporarily suspended. Durkheimians thus locate the essence of religion not in the systematic devotion to supernatural beings, but in social actors' periodic projection of moral meaning onto the lifeworld. Once we start to look at religion as a moral rather than a theological practice, we become able to interpret even the most secular of activities – such as reimagining the future as a contingent realm – in religious terms. Traversing this chapter is thus the following formula: The future became contingent, but sacrality remained – albeit in a moral rather than a purely theological form.

To give empirical substance to the above, I turn in this chapter to Hamburg's building exhibition held between 2006 and 2013. 'Building exhibition' – formally known as an 'international building exhibition', *Internationale Bauausstellung*, or IBA – is the name given to a German model of city-making, originating in Stuttgart at the dawn of the 20th century and nomadically moving from city to city ever since. Host cities may invoke a building exhibition when they deem their existing planning routines as inadequate to tackle some of the city's urbanistic challenges. In response, a committee of high-profile professionals – architects, urbanists, engineers – congregates in the host city to develop and display the latest advances in urbanism and architecture. They are, as John Urry (2016: 11) put it, given 'the power to make the future'. Building exhibitions constitute an urban variant of the more widely recognized world's fairs, where the idea of a predetermined future was similarly cast aside in favour of a marked confidence in the future's intrinsic contingency (De Cauter, 1993; Roche, 1998). Moreover, building exhibitions continue to be part of the larger amalgam of urban future-making practices, as their central aim remains to imagine and actualize the so-called city of tomorrow (Robinson, 2024).

The Hamburg exhibition went by the name *Leap Across the Elbe*. The river Elbe divides Hamburg into northern and southern halves, two areas that differ not only in spatial location but also in socio-economic prosperity (Chamberlain, 2020; Volont, 2024). While the north is typically perceived as the city's affluent centre, the south has long been framed as its problematic periphery. Heavy industry, major transport arteries, waste dumps, and coal-fired power

plants have systematically been relegated to the southern corridor. The Elbe Islands have also served as arrival zones for vulnerable migrant populations, seeking employment in the dirtier, more hazardous jobs in Hamburg's harbour economy. Furthermore, in 1962, the south suffered a catastrophic storm surge that breached dikes, killed over 300 people, and left thousands homeless. And, in 1984, it became the stage of an ecological scandal when toxic fluids were found leaking from the Georgswerder industrial waste dump. These events underscore the social, ecological, and infrastructural divide between Hamburg's two halves, a divide the *Leap Across the Elbe* aimed to overcome.

Hamburg's building exhibition constitutes an emblematic expression of the secular belief in the future's contingency – and yet, the aim of this chapter is to think sacrality and contingency together, rather than to posit them as mutually exclusive. The chapter will therefore develop as follows. In the next section, I lay some theoretical groundwork by shedding more light on Durkheim's *Elementary Forms* and its larger effects within the sociology of the sacred. Thereafter, in the three subsequent sections, I point to three intersections between sacrality and contingency at Hamburg's building exhibition. Under 'Sacrality and contingency I: From the sacred time of collective effervescence to a positive state of exception', I show how Durkheim's notion of collective effervescence is highly relevant to explain how the future is rendered contingent in secular contexts. More precisely, what is called the 'sacred time of collective effervescence' in Durkheim emerged at the building exhibition as a 7-year 'state of exception'. This entailed a temporary suspension of the usual limits of institutionalized urban planning, resulting in the loosening of regulatory constraints, the unleashing of futural imagination, and an embrace of experimentality. Then, under 'Sacrality and contingency II: Moral meaning-making through the sacred and the profane', I focus on the worldviews held by the exhibition's future-makers as they sought to render the future contingent. In particular, I show how they discursively coded the urban lifeworld as being torn between sacred and profane forces: winning versus losing, curiosity versus fear, risk versus tradition, and the city as a whole versus its southern corridor, respectively. Finally, under 'Sacrality and contingency III: Built forms as iconic condensations of contingency', I turn to the exhibition's material output. I posit the exhibition's 'lighthouse projects' – buildings intended to be gazed at by observing publics – as iconic symbolizations of the future's fundamental openness. I show how these projects' material surface was given symbolic depth through rituals, such as ceremonial openings or the laying of a foundation stone, ultimately turning the lighthouse projects into sacred representations of the future's makeability.

The conclusion constitutes less a definite claim than an invitation to further debate. I finally suggest that the aforementioned three intersections between sacrality and contingency allow one to recognize similar forms of power among priests, prophets, and future-makers. Despite their differing engagements with the future, these actors similarly deploy discursive and material means to determine within the social edifice which forms of life ought to be led and which ought to be avoided. Yet whether these forms of life will prove to be just and equitable remains, of course, an open question.

The Durkheimian sociology of the sacred: A theoretical preamble

The sociology of the sacred has its roots in the work of Émile Durkheim, the French founder of sociology, and more precisely in Durkheim's (1912) pivotal *The Elementary Forms of Religious Life.* Durkheim's endeavour was to discover the universal characteristics of religious praxis. When we strip religion to its bare essence, hence to its 'elementary forms', what is it that remains? Durkheim famously found the essence of religion not in its 'content' – for example, the presence of supernatural beings – but in its deeper symbolic structure. This deeper structure was nothing other than the moral contrast between the sacred and the profane, a symbolic dyad through which social actors morally 'classify' their surrounding lifeworld (Durkheim and Mauss, 1903). As befits a structuralist thinker, Durkheim (1912: 38), with regards to this essential dyad, argued that 'in all the history of human thought, there exists no other example of two categories of things so profoundly differentiated or so radically opposed to one another'.[1] And as stated before, Durkheim consistently pointed to the fact that social actors' consciousness of the sacred and the profane emerges particularly

1 Post-structuralists will likely cringe at the very notion of two mutually exclusive categories. And rightly so: They might argue that framing the sacred and the profane as binary opposites reinforces a conservative, perhaps even regressive, vision of the social world – one in which distinctions such as man and woman, good and bad, us and them, young and old, and countless other classificatory schemes are reproduced as if no ambiguity or grey zone exists. However, to identify the deployment of the sacred and the profane within a particular lifeworld does not automatically entail intellectual endorsement of such distinctions. It is crucial to distinguish between 'descriptive' and 'prescriptive' theorizing. In this chapter, I aim not to 'prescribe' or endorse these categories, but simply to 'describe' how they are mobilized by social actors in the realm of future-making.

during the sacred times of collective effervescence: those periods in social life when the usual limits to thought and action are temporarily suspended. Secular phenomena such as festivals, protests, and decidedly also projects of future-making, as will be shown below, can thus be seen as 'effervescent' intervals during which the moral dyad of the sacred and the profane moves to the forefront of consciousness.

Elementary Forms was Durkheim's final book, completed 5 years before his 1917 death.[2] However, in the grander scheme of the history of social theory, it wouldn't take long before a group of socially critical scholars – among them Michel Leiris, Georges Bataille, and Roger Caillois – began to meet in the late 1930s in Parisian cafés to establish the infamous Collège de Sociologie, where a post-Durkheimian 'sacred sociology' would be practiced. Heavily inspired by *the Elementary Forms*, and largely opposing the then-dominant Freudian emphasis on the individual subconscious, the Collège sought out traces of the sacred within the collective life of French society. Yet the *Collège* diverged from Durkheimian orthodoxy in one key respect: While Durkheim saw the sacred as a normative force capable of restoring social order in a fractured France – we must remember that his later work emerged amid the First World War and the fallout of the Dreyfus Affair – the *Collège* repurposed the sacred as a critical lens to expose the symbolic mechanisms underpinning oppressive systems, most notably fascism. Though I refrain from considering future-making itself as oppressive, this chapter follows the *Collège's* lead in using the sacred as an heuristic to critically uncover the symbolic operations at play during practices of future-making; I will return to this point in the conclusion.

Fast forward, then, to the new millennium. 'It is often claimed that we live in a secular age. But we do not live in a desacralized one', wrote Gordon Lynch (2012a) in *The Sacred in the Modern World*. Whilst modernity has been cast as a secular age, Lynch and his colleagues argue, again in Durkheimian fashion, that the symbolic dyad of the sacred and the profane continues to be woven through contemporary, secular life: It structures politics (Giesen, 2006), capitalism (Coudert, 2023), and media (Lynch, 2012b), to name a few.

For Jeffrey Alexander (2003), analysing the sacred within secular contexts constitutes a kind of *social psychoanalysis*. Sociologists of the sacred thus delve into the collective consciousness and concerted actions of a particular social

2 The chroniclers of Durkheim's biography (Strenski, 2010; Smith, 2020) relate his sudden death to the grief following the passing of his son, who died as a soldier in the First World War.

world – in the case of this chapter, the world of professional future-making – to uncover how, when, and by what means social actors morally classify their surrounding lifeworld. The sociology of the sacred is thus an attempt to render the invisible visible. Future-makers rarely, if ever, speak explicitly in terms of 'the sacred' or 'the profane', yet sociologists of the sacred reveal how this binary operates beneath the surface – as a latent force, almost a grammar, shaping what is said and done in particular contexts.[3]

The sociology of the sacred thus transcends the long-standing theoretical divide between structuralism (which posits that action is largely shaped by supra-individual structures) and hermeneutics (with its emphasis on interpreting actors' meaning-making) (Alexander, 2003, 2004; Lynch, 2012a). The synthesis of these approaches, known as *structural hermeneutics*, underpins this chapter. The 'structural' refers to the latent oppositions of sacred and profane; the 'hermeneutic' to the interpretation of social actors' thoughts, texts, and actions. In this vein, my account is based on an extended examination of a wide range of public documents related to Hamburg's building exhibition, including promotional materials, the exhibition's inaugural memorandum *Sprung über die Elbe*,[4] policy papers issued by the city administration, transcripts of speeches by architects and planners, recapitulations of meetings

3 The attentive reader may notice a number of sociological parallels between the sociology of the sacred and the 'praxeological' approach developed by Pierre Bourdieu (1977). Yet there are pivotal divergences between the kind of sociology pursued in this chapter and the Bourdieusian perspective. In Bourdieu's framework, culture functions primarily as a dependent variable: as something social actors draw upon, mobilize, and manipulate to maintain or enhance their social position within a given field. By contrast, Durkheim-inspired sociologists of the sacred emphasize culture's 'relative autonomy' (see, e.g., Alexander, 2003). Here, culture is not a reflection of social position but an independent variable: Narratives, rituals, and meaningful objects – including the sacred/profane distinctions they carry – are not merely strategic tools but constitutive forces in social life. They are imagined, enacted, and sustained by actors, and once established, they shape social realities in their own right. This perspective also entails a different view of the social actor: not as a purely profit-seeking or strategic agent, but as a meaning-making being, capable of moral judgment and critical reflection. The choice between these two opposing frameworks is not a matter of right or wrong, but rather one of intellectual affinity.

4 A memorandum is a formal document established before the commencement of a project. It outlines the terms and agreements reached by collaborating parties – in this case, the City of Hamburg and the exhibition's organizing committee. All non-English quotations from the memorandum have been translated by the author.

and conferences, and white papers authored by the exhibition's participating urbanists.

In sum, my structural-hermeneutical account of urban future-making is a document-based one. The focus on documents is deliberate: They represent the final consolidation of the meanings that social actors choose to project into the public sphere. Documents capture, in their finished form, what actors involved in a particular phenomenon wish to render legible to their observing publics. Of course, documents often mark the endpoint of longer 'backstage' processes of revision and adaptation; processes that typically remain inaccessible to the scholar. Yet it is precisely this final form, the version actors choose to circulate publicly, that interests me, for it reflects what they ultimately want to be seen, known, and understood. The results of that exercise are now discussed in three sections exploring the intersections between sacrality and contingency at Hamburg's building exhibition.

Sacrality and contingency I: From the sacred time of collective effervescence to a positive state of exception

In *Elementary Forms*, Durkheim was fascinated by societies' cyclical meandering between routinized periods of everyday life on the one hand and celebratory periods of religious devotion on the other.[5] When the rules, rhythms, and routines of daily existence are temporarily suspended, periods of '*collective effervescence*' *emerge*. These periods constituted for Durkheim a 'sacred time' in which the usual limits to thought and action are lifted. After all, '*effervescence*' stems etymologically from *ex* (out, up) and *fervescere* (to boil), evoking the image of something that 'boils up'. The sacred time of collective effervescence, then, is a period in which thoughts and actions that would ordinarily be unthinkable or withheld are allowed to 'emerge out of' the social self. Think, for example, of the loosening of mores, of the dancing and singing, and of the mythical storytelling emerging during periods of religious festivity.

Now, the point I want to make in this section is that a structurally similar dynamic can be recognized at Hamburg's building exhibition. There, too, we find a movement back and forth between routinization on the one hand and effervescence on the other. More precisely, the building exhibition presupposed a

5 In Christian liturgical cycles, one recognizes the cyclical meandering between Ordinary Time and Holy Time (see, for instance, Eliade, 1987).

temporary suspension of the usual logics of institutionalized urban planning. At Hamburg's building exhibition, such suspension was called a 'positive state of exception'[6] and was deemed necessary to open up the city's future to multiple possibilities.

The exhibition's state of exception ran from 1 September 2006 to 3 November 2013. In a booklet accompanying the exhibition, the exhibition's CEO Uli Hellweg (2013: 22) almost literally replicated Durkheimian vocabulary, writing that 'all building exhibitions have one thing in common: a time out of the ordinary life to create something new'. The suspension of the city's planning echelons' institutional restrictions was lauded, for example, by an urbanist giving a speech at one of the 'IBA meets IBA' conferences, which were held throughout the 7 years of the exhibition's lifespan. 'Building exhibitions', the urbanist put it, must 'abandon' and 'leave administrative routine, which presents unreasonable demands for all those involved and affected' (Koch, 2013). The prevailing view was that institutionalized planning is slow, bureaucratic, and dull – that it constitutes a habitual form of spatial production that hampers the emergence of newness.

But once the usual logics of institutionalized planning were suspended, what, in turn, did this suspension make possible? First, and logically following from the aforementioned suspension of institutional structures, the state of exception freed the exhibition's urbanists and architects from regulatory constraints. More precisely, they were less bound than usual by the bureaucratic hold of the city's planning apparatus. 'Building exhibitions', one relatedly reads in the exhibition's inaugural memorandum, must allow the future-maker to 'detach from the regulations of everyday planning for a limited period of time to try out new forms and processes' (IBA Hamburg, 2005: 31). The building exhibition, the memorandum continued, had to generate 'speed without volatility', 'destandardization without loss of quality', and 'flexibility without arbitrariness' (ibid.: 31). During the exhibition's state of exception, administrative procedures, including permissions for urban interventions, were able to be accelerated.

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6 Urban states of exception, for example during mega-events such as economic summits or the Olympic Games, have been discussed in urban research before (Baptista, 2013; Farías and Flores, 2017). Less theorized, however, is the religious nature of such states of exception, a lacuna that this chapter seeks to fill (but for an exception to the rule, albeit one that is rooted in a different theoretical framework, see Schinkel and Van Den Berg, 2011).

Second, the state of exception entailed an unleashing of futural imagination. The suspension of mundane forms of city-making was thus not merely a procedural shift; it was also an invitation to participating architects, urbanists, and engineers to shed the yoke of cognitive constraints. Urbanistic 'big shots' – 'the crème de la crème of the planning profession', as one introductory speaker put it at the 'IBA meets IBA' conference (Doehler-Behzadi, 2013) – were flown to Hamburg to present their visions for the future. Among them were Richard Sennett and Saskia Sassen, the former a renowned urban theorist and planner, the latter the author of the canonical *The Global City* (Sassen, 2002). Furthermore, the 7-year exhibition was punctuated by numerous seminars, conferences, and expert meetings during which urbanistic scriptures – the kinds of texts having high symbolic value within the larger community of urban future-making – were dusted off in order to gain inspiration for the future: Henri Lefebvre's musings on 'differential space', Peter Sloterdijk's ideas on 'urban atmospheres', and Jane Jacobs's defences of 'lively cities', to name a few. In this vein, the sacred times interspersing religious liturgical calendars are similarly marked by a systematic inspection of holy scriptures.

Third, the state of exception entailed an intensified movement towards urban experimentation. Anno 2025, 'experimentation' has become a buzzword in the world of urban future-making (see, for instance, Grubbauer et al., 2024), yet at Hamburg's 2006–2013 building exhibition, the dominance of the experiment could already be felt (Chamberlain, 2020). The first sentence encountered by any reader exploring the exhibition's online discourse is this one: 'At an IBA, people are researching and developing live, just like in a lab, within a given time frame' (IBA Hamburg, 2007b). The exhibition's memorandum stated similarly that 'the experimental possibilities of a building exhibition offer the chance to look for exactly these new paths' (IBA Hamburg, 2005: 24), and a participating urbanist argued at one of the aforementioned 'IBA meets IBA' events that 'new insights into the possibilities of urban change cannot be obtained without experiments and risks' (Koch, 2013). The embrace of experimentality meant that several projects were imagined on paper but never fully realized, while other projects – such as the Georgswerder Energy Hill, to which I return below – were developed in an explicitly experimental spirit.

In sum: The loosening of regulatory constraints, the unleashing of futural imagination, and the embrace of experimentation all reveal how the secular practice of exploring contingent futures resembles the sacred time of collective effervescence. One might argue that during this so-called state of exception it was attempted to suspend the laws of cause and consequence. The historical

trajectory Hamburg had been on – namely the decades-long struggle with the harms of the southern section – was rendered contingent, opened up, given new directions, reinstituted. As can be read in one of the exhibition's accompanying documents: It is all about exploring 'the uncharted territory of the future' (IBA Hamburg, 2013a).

Sacrality and contingency II: Moral meaning-making through the sacred and the profane

In the previous section, I showed how the suspension of the usual logics of institutionalized planning gave rise to the exhibition's *state of exception* – a temporal rupture reminiscent of Durkheim's notion of the sacred time of collective effervescence. I now turn to this 7-year interlude in more depth, focusing on the worldviews held by the exhibition's protagonists as they sought to render the future contingent. This section proposes that these actors' beliefs about the urban lifeworld were structured by a symbolic struggle between sacred and profane forces. This struggle, furthermore, exerted a coercive influence on the exhibition's key actors: It compelled action and urged them to render the future contingent. Such dynamics constitute an elementary mechanism of religious life more broadly: It is precisely in sustained periods of effervescence – liturgical holy time, mythic storytelling in ancient societies, festivals in late-modernity – that social actors become temporarily attuned to what they regard as sacred (and thus attractive) and profane (and thus repulsive).

'The global trend is clear: Winning and losing regions are broadly apparent', declared one of the exhibition's urbanists during an event in the Hamburg Senate aimed at rallying support for the building exhibition (Sieverts, 2004). Meant here was the growing divide between cities perceived as attractive among white-collar workers, investors, and tourists on the one hand, and cities neglected, bypassed, and cast aside on the other. Immediately afterward, the same urbanist posed a rhetorical question to his audience – consisting of political dignitaries and planning officials – asking whether they wished to view the future as 'a depressing space of fear' or as 'a curious space of possibilities' (Sieverts, 2004). The exhibition's CEO, furthermore, invoked in one of the project's booklets the legacy of the early 20th-century building exhibitions.[7] 'All

7 One of the previous iterations still etched in the collective consciousness of current IBA organizers is the 1927 edition in Stuttgart, which featured contributions from figures

building exhibitions', he wrote, 'sought to overcome the traditional. The initiators' courage, risk appetite, and enthusiasm were preconditions' (Hellweg, 2013: 22). In these expressions, we encounter what Alexander (2003; 2012) described as a 'dyadic discourse'. The exhibition's organizers may be said to enact an urban cosmology shaped by stark oppositions between sacred and profane forces: winning versus losing, curiosity versus fear, the embrace of risk versus an attachment to tradition.

The classificatory cosmology of the exhibition's involved professionals becomes even more evident when we examine their conceptions of Hamburgian forms of life. As noted in the introduction, the Elbe Islands have long borne the weight of a difficult history. Shaped by the systematic concentration of heavy industry in Hamburg's south, as well as by events such as the 1962 storm surge and the 1984 Georgswerder dioxin scandal, the area has been persistently associated with the intersecting burdens of ecological degradation, infrastructural decay, and social segregation. Against this backdrop, one of the exhibition's online information sheets declared that the Elbe Islands would be transformed from 'a city backwater' and 'a choked inner periphery' into 'a prime example of urban renaissance' (IBA Hamburg, 2013b). In another project statement, it was argued that 'every IBA has its own special location. In Hamburg it is the Elbe Islands of Wilhelmsburg, Veddel, and Harburg Upriver Port' (IBA Hamburg, 2007a). And in the exhibition's memorandum, the Elbe Islands had already appeared as 'a potpourri leaving quite ambivalent impressions' and as 'a dense juxtaposition of problem areas' (IBA Hamburg, 2005: 23). The classificatory logic that emerges here positions the city of Hamburg as *sacred*, namely as a socio-material entity having the highest moral value, while casting the city's southern districts as *profane, namely as an area that harms, threatens, and pollutes the city as a whole*.

It must be added that the struggle between the larger city and its profane south, as reported in the exhibition's aforementioned discourse, continued a longer lineage of meaning-making in which the Elbe Islands were stigmatized as the city's problematic appendage. Newspaper coverage of the Elbe Islands around the turn of the millennium tended to focus on local acts of violence, characterizing the Islands as 'the Bronx of the north' (Hamburger Abendblatt,

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such as Ludwig Hilberseimer, Le Corbusier, and Ludwig Mies van der Rohe. It is worth noting the heavily gendered nature of the IBA – and urban future-making general – at this point. For a critique of this nature, see Beatriz Colomina's (2000) *Sexuality and Space*.

2000) and as 'a place of poverty, unemployment, and foreigners' (Gipp, 2001). A later article concerning the infrastructural decline of the Islands framed them as 'a neighbourhood in crisis' (Twickel, 2011). Popular culture echoed this perception as well, most notably in Fatih Akin's 2009 movie *Soul Kitchen* (Strüver, 2015). In an infamous scene, the main character informs a friend about the location of his future restaurant: Wilhelmsburg. The friend's jaw immediately drops: Of all places, why there?

When lifeworlds become divided into forces of good and evil, it is only a matter of time before the language of 'sin' begins to surface. In 1929, Fritz Schumacher – Hamburg's influential early 20th-century head of urban planning – once famously declared: 'Geest land is for living, marshland is for working' (Schubert, 2021). While the city is geographically split between the drylands north of the Elbe and the wetlands to its south, Schumacher's dictum crystallized this natural divide into a rigid social and economic hierarchy. Schumacher's pronouncement laid the groundwork for successive waves of industrial development in Hamburg's southern districts, further entrenching socio-economic and ecological asymmetries between the city's upper and lower halves. Though widely celebrated as one of Hamburg's most visionary urbanists, Schumacher was subtly recast by the exhibition's organizers as the author of what might be called an '*originary sin*', a foundational act through which the city's subsequent profanities emerged. In the memorandum, for example, it was argued that Schumacher's 'compartmentalized plan' had to be overcome by turning the Elbe Islands into a locus of 'urban redevelopment' (IBA Hamburg, 2005: 22).

Importantly, the perceived struggle between sacred and profane forces exerted a coercive influence on the future-makers themselves. That is, the ensemble of the aforementioned world-views operated as a supra-individual repertoire of meaning; it constituted a symbolic framework that urged, even compelled, the exhibition's actors to render the future contingent, malleable, open to transformation. 'Hamburg has been rebuilt and rebuilt several times, not only after the Great Fire or the Second World War', declared Olaf Scholz (2013), then the mayor of Hamburg, at one of the exhibition's conferences; continuing, he stated: 'what we do know, is that we can shape the future'. Similarly, an online project statement declared that 'there is probably no better place in Germany to investigate the future of our cities, as it [Hamburg's southern section] presents us with all the problems and opportunities' (IBA Hamburg, 2007a). Such utterances reveal how a dyadic vision of the urban fabric – structured around the symbolic tension between forces of good and evil – obligated the

exhibition's key actors to remake the future, hence to choose contingency over determination.

Finally, I would like to argue that it is worthwhile to re-read a series of canonical texts within the realm of urban future-making – as well as the visions for future urban life they imply – through the lens of the sacred and the profane. Rather than assessing these texts and visions in terms of their technical feasibility, we might instead consider the moral dimensions they entail. Ebenezer Howard's (1902) *Garden Cities of To-morrow* can be seen as articulating a struggle between the ills of industrial pollution and the redemptive promise of the green city. Ludwig Hilberseimer's (1944) *The New City* envisions an eternal battle between the chaos of the modern metropolis and the sacrality of rational order. Constant Nieuwenhuys's (1959) *New Babylon* casts the urban commonwealth as torn between the profanities of functionalist rigidity and the sacred remedy of play. And in each of these cases, it is precisely the tension between the sacred and the profane that animates and determines the authors' envisioning of new, hence contingent, urban futures.

Sacrality and contingency III: Built forms as iconic condensations of contingency

In the preceding sections, I discussed the exhibition's state of exception as well as the discursive construction of sacred and profane forces within that state of exception. Yet religious practice is also, fundamentally, a material one: One must only think of the erection of shrines, temples, churches, or holy statues in order to grasp how built forms permeate religious life. In *Elementary Forms*, Durkheim had already drawn attention to this material dimension, but as Alexander (2012: 16) argued, Durkheim 'opened the door, but he barely stepped inside' – let alone created analytic opportunities to think about sacred materiality in a city subject to the secular act of urban future-making. So, in what ways could we think of the intersection between sacred matter and contingency at Hamburg's building exhibition?

In this section, I would like to consider the exhibition's material output – more specifically its resulting buildings and infrastructures – as sacred icons representing the future's contingency. An icon, after all, is a profoundly religious phenomenon. In early Christianity, the term denoted highly sacred depictions of Jesus and the Saints (Solaroli, 2015) – depictions, furthermore, that from time to time were subject to effervescent acts of devotion. Yet, icons

permeate secular social life too. More particularly, secular icons can be seen as material entities whose 'material surface' carries a certain 'symbolic depth' (Alexander et al., 2012). And this is precisely what the exhibition's buildings and infrastructures were meant to be: Their material surfaces were meant to symbolize the idea that the future could be otherwise. They constituted, in other words, iconic condensations of contingency.[8]

But first, something must be said about the exhibition's overall morphology. Over 70 projects were completed as part of Hamburg's building exhibition, each categorized within one of three thematic clusters, named 'Cities and Climate Change', 'Cosmopolis', *and 'Metrozones'*. The cluster concerning climate change, devised in response to the Islands' aforementioned ecological vulnerabilities, focused on renewable energy production. Photovoltaic panels, wind turbines, geothermal systems, and solar thermal collectors were introduced to create a locally powered urban fabric (IBA Hamburg, 2013c). The cluster regarding cosmopolitanism, conceived as an answer to the Islands' assumed segregation, evolved around ethnic diversity. Creative quarters, language centres, and new public spaces were designed to cultivate what in planning circles is called 'social mix' (IBA Hamburg, 2013d). The *cluster called 'Metrozones'*[9] *was intended 'to* demonstrate how inner peripheries can be transformed into neighbourhoods worth living in' (IBA Hamburg, 2013a). *As such, the exhibition's participating architects and urban designers aimed to undo the transitional character of the Elbe Islands, turning them instead into a residential area where* container stacks, dockside cranes, and railways lines would blend with new homes and workplaces (IBA Hamburg, 2013a).

Yet, thinking of built forms as iconic condensations of contingency requires a consideration of the exhibition's 'lighthouse projects'. As described in the exhibition's memorandum, 'lighthouse projects' was the name given to specific displays having 'a special appeal to the audience' (IBA Hamburg, 2005: 20). Lighthouse projects were 'the projects that matter'; they were destined 'to become symbols of Hamburg's urban development ambitions', altogether

8 Readers interested in 'iconic architecture' – albeit from a post-Marxist perspective – might delve into the work of Leslie Sklair (2006), Maria Kaika (2010) or Charles Jencks (2005).

9 Thus, Hamburg had to become not only a 'cosmopolis', but also a 'metropolis'. The concept of metropolitanism was thus, etymologically speaking, taken literally: *metropolis* – derived from the Greek *mētēr* (mother) and *polis* (city) – implies an urban form in which a commanding centre governs its peripheries.

'demonstrating the topics of the future' (ibid.). Lighthouse projects, finally, had to 'develop charisma', to 'stand out', to 'create orientation' (ibid.: 32).

One of the lighthouse projects within the cluster on climate change was the Georgswerder Energy Hill. The aforementioned toxic Georgswerder waste dump had been transformed into a grassy hill with wind turbines on top: once a 'toxic landfill', now 'a hill of new horizons' (IBA Hamburg, 2013e). The project produced local energy through wind and solar power and contains to this day a visitor centre highlighting the hill's history. A lighthouse project within the cluster on cosmopolitanism was the Gateway to the World Educational Centre. Different educational faculties – a language centre, a social support unit, a primary school, and a science centre – were clustered around a central courtyard. The transparency of glass and the openness of space were intended to display a sense of cosmopolitan worldliness (IBA Hamburg, 2013f). Finally, a lighthouse project within the 'Metrozones' cluster was the Elbinsel Quarter, a newly designed residential area consisting of apartment blocks lined along the urban creeks characteristic of the Elbe Islands (IBA Hamburg, 2013g). In all, these lighthouse projects can be seen as iconic condensations of contingency: Their material surface was precisely intended to carry a symbolic depth, namely, to indicate that different futures were possible or, phrased differently, that the future could be contingent.

However, nothing is iconic by default. Objects and architectures only become icons through ritualized acts of iconization. It is therefore crucial to scrutinize the ceremonial doings and sayings that accompany such transformations – whether at the beginning, when a project is symbolically initiated, or at the end, when its built output is formally inaugurated. Consider, for instance, the laying of the foundation stone for the Gateway to the World Educational Centre by the mayor of Hamburg. Speaking before an audience of politicians, journalists, and citizens, the mayor proclaimed that the building exhibition sought to 'implement integrated city-planning and educational-policy models for the future', adding that 'the Gateway to the World Educational Centre is one such model, uniting great hopes and great tasks ahead'. Equally emblematic were the official openings of the exhibition's lighthouse projects, which were invariably marked by the unveiling of the 'IBA plaque' – a material emblem affixed to each display. The plaque, depicting a figure leaping over a blue stretch of water, embodied the exhibition's guiding theme: the aforementioned *Leap Across the Elbe*. At the inauguration of the Woodcube, a wooden apartment block in the Elbinsel Quarter, the mayor stated: 'By officially unveiling the IBA plaque for this building today, we are bringing its special features and fantas-

tic versatility to the attention of the public. It is therefore an excellent example of the innovative nature of the IBA' (IBA Hamburg Press Office, 2013). Such rituals, unfolding in and around these architectural sites, are central to their iconization. They inscribe symbolic meaning onto the icon's material surface, rendering them iconic condensations of contingency.

One year before the official 'presentation year', Hamburg's futural developments were showcased in an exhibition at the European Parliament titled *Building Cities Anew: Tomorrow's Metropolis*. Its stated aim was to 'spark an international exchange of ideas and to encourage people to visit Hamburg in 2013, the year of the IBA presentation' (IBA Hamburg Press Office, 2012). Speaking at the vernissage in Brussels, the exhibition's CEO addressed an audience of members of parliament and urban planners, proclaiming that 'in the coming year, IBA Hamburg will be celebrating its great presentation year after seven years of development', adding that 'it is a good point in time to encourage debate in a European context, and to show that Hamburg is a city of the future' (IBA Hamburg Press Office, 2012). Thus, concluding this chapter's tour throughout the religious dimensions of future-making, one might argue that the exhibition's lighthouse projects gave rise to new forms of secular pilgrimage. Through the fusion of material surface and symbolic depth, these architectural icons sought to draw publics from afar – inviting them to witness, in Hamburg, how the future could be imagined otherwise. If Hamburg, as Hellweg had it, constituted 'a city of the future' once the exhibition had been finished, aficionados of the built environment could undertake symbolic journeys to discover in the holy city of Hamburg what that future would look like. Against this backdrop, the exhibition's lighthouse projects embodied the persistence of auratic transcendence in the modern metropolis, for the buildings on display were intended to imbue upon the beholder less a fetishistic fascination with commodity objects than a collective consciousness of the future's contingency.

Conclusion: Of priests, prophets, and future-makers

With the onset of secular modernity, the future became a contingent construct. No longer the necessary consequence of divine determination, it emerged instead as a domain open to human desire. Scholars such as Koselleck (2004), Adam and Groves (2007), and Williams (1973) have gone to great lengths to clarify the interrelationship between the waning of institutionalized

religion on the one hand and the corresponding openness of the future on the other. As Adam and Groves (2007) so powerfully put it in their pivotal *Future Matters*, modern societies underwent a fundamental shift 'from providence to progress'. Such a shift was, of course, also an urban one: It was at the dawn of modernity that the urban future first began to emerge as contingent – as a realm of the not-yet, open to human desire and control.

Against this backdrop, I argued in this chapter that while the future did indeed become contingent in secular modernity, the sayings and doings of urban future-makers continue to resemble religious praxis. The seed of this argument lay in Durkheim's 1912 classic *The Elementary Forms of Religious Life* as well as in the so-called sociology of the sacred that unfolded in its wake. Central to the late-Durkheimian tradition is the insight that secularization does not necessarily entail desacralization. Once we begin to understand the sacred and the profane as categories denoting, respectively, that which holds high moral value and that which provokes repulsion, we can start to explore the religious dimension of deeply secular practices, among them the secular practice of urban future-making. Consequently, my 'elementary forms of future-making' foregrounded three intersections between sacrality and contingency at Hamburg's building exhibition. First, following Durkheim's core insight that religious praxis emerges when the routine coordinates of everyday life are suspended, I examined the exhibition's 'state of exception' as a 7-year period of collective effervescence, characterized by loosened regulations, an unleashing of futural imagination, and a turn towards experimentation. Second, I argued that the exhibition's future-makers' world-views entailed an enduring struggle between sacred and profane forms of life – a struggle that imbued upon them a sense of moral urgency to shift the city's historical trajectory. Finally, I turned to the exhibition's material output, focusing on its so-called lighthouse projects. Through sustained ritualistic acts, these structures became iconic condensations of the future's contingency.

A conclusion that emerges from this Durkheimian exercise is less a definitive claim than a largely reflective invitation to further debate. While priests and prophets on the one hand, and urban future-makers on the other, engage with the future in fundamentally different ways, they nevertheless draw upon a similarly religious repertoire of action to render the future legible, and in doing so, they wield comparable forms of power in the larger social edifice. Since the rise of Christianity and its ensuing grip on social life in many societies, priests and prophets have fulfilled a pivotal social role: interpreting divine providence through preaching and prophesying and, from there, guiding

their constituencies towards the forms of life necessary for salvation in the afterlife. A similar statement can be made about secular future-makers. Secular future-makers may construe the future as radically open rather than divinely ordained, but they, too, set out to determine within the grander scheme of society which forms of life ought to be led and which are to be avoided. Through the case of Hamburg's building exhibition, we saw how the participating future-makers determined that the southern section of the city had to become 'climate resilient', 'cosmopolitan', and a 'metrozone'. In that sense, the exhibition's future-makers can be said to take centre stage – just like priests and prophets – as moral judges, as powerful actors symbolically distinguishing between good and evil ways of urban existence. Whether their reimagined futures will prove just and equitable further down the temporal line, remains, of course, an open question.

Finally, I would want to argue that both the sociological approach and the empirical findings presented in this chapter hold relevance beyond the specific case of Hamburg's building exhibition. The exhibition is but one instance within a broader constellation of cases in which powerful urban professionals set out to steer the future in new directions. We live in a time when built environment professionals – be they experimentalists, techno-optimists, transition thinkers, or post-humanists – are asserting themselves in public arenas as agents capable of shifting futures from predetermined trajectories to contingent realms. In this context, it is worthwhile to ask whether these findings on sacrality and contingency can be extended to the wider field of professional urban future-making. I thus hope to motivate social scientists to investigate the act of future-making not merely in terms of its technical accuracy, but through its underlying and often-overlooked moral dimension. Today, a wide array of cases present themselves for such inquiry. There is ample opportunity to bring to light how the moral dyad of the sacred and the profane permeates the doings and sayings of built environment professionals – and, by extension, how this dyad gives rise to secular rituals, icons, and prophecies of urban future-making. As I argued at the very beginning: The future became contingent, but the sacred remains.

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7. Urban air mobility as a new level for transport?
Technological innovation as a contingent process in urban mobility future-making

Carsten Gertz and Katharina Manderscheid

Introduction

> We all want to spend less time traveling and more time living. At Joby Aviation, we're making that possible with our pioneering electric aircraft. It's a faster, cleaner, and smarter way to carry people through their lives. Powered by six electric motors, our aircraft takes off and lands vertically, giving us the flexibility to serve almost any community. Flying with us might feel more like getting into an SUV than boarding a plane.
> *(Joby Aviation, 2025)*

Organizing the transportation of people and goods is one of the major challenges of urban development. Fossil-fuel-based motorized transport is a major cause of global climate change and, especially for residents of cities, a major problem for health and quality of life, as it causes air pollution, noise, and accidents (Paterson, 2007; Manderscheid, 2014). In light of the necessary ecological transition of urban transportation, a new technology is under development, and its integration into urban transport systems is being envisioned: urban air mobility (UAM), in particular, electric vertical take-off and landing aircrafts (eVTOLs), also commonly referred to as air taxis. Currently, the topic is being discussed primarily in the engineering and transport sciences. In so-

cial science research on transport and mobility, up to now UAM has received very little attention. The media response so far has been cautious to critical and sees air taxis as a rather unlikely future for German or European cities. With the insolvencies of German start-up companies Volocopter and Lilium, and the announcement by Airbus at the beginning of 2025 that it would suspend the development of the CityAirbus, the eVTOLs has appeared in the media as a failing technological innovation. Irrespective of this, technological development is being continued through public-funded research programmes. Furthermore, several start-up companies worldwide are attempting to set up the first urban air taxi system. Thus, the development and political promotion of UAM stand in strong contrast to the problems of the current transport sector, in particular the necessity to reduce motorized traffic and redistribute public space. This raises the questions of what problem air taxis are supposed to solve, what promises are associated with eVTOL technology, and what the implementation of UAM in European cities could look like.

Figure 1: A vision – CityAirbus flying over Munich.

Source: Airbus Helicopters.

In social perception as well as in the traditional history of science and technology, innovations are typically reduced to single technical inventions and the material novelties developed by individual inventors (see, e.g., Kirchner and Ruhrort, 2014: 1ff.). Looking back from the present, the history of progress often seems like a logical sequence of useful technical solutions to social problems – the steam engine made industrialization possible, the car made individual mobility possible, and the computer made digitalization possible. By this token, in a future present, the technological innovation of UAM may be seen as a logical prerequisite for shifting transport to the third dimension of cities and thus increasing mobility overall.

However, from a social scientific understanding, technological innovations do not just happen and spread according to a given demand. Especially large technological systems such as transport systems are understood as being embedded in a broader socio-economic context, and their advancement results from political will and future-making agency (Kirchner and Ruhrort, 2014; Grubbauer et al., 2024a). For example, recent economic studies make clear that technological developments arise and become established within a specific institutional context (DiMaggio and Powell, 1983; see also Lynn et al., 1996). The question of how and why current technologies have succeeded cannot, according to a large number of social science case studies, be reduced to single causes or actors (Kirchner and Ruhrort, 2014: 4). With this in mind, the multilevel perspective (MLP) as an approach to understanding socio-technical transition, as advocated by Frank W. Geels (2004; 2005a) in particular, distinguishes between the production aspect and the selection environment of technological innovations as separate areas that are linked to each other via regulations, markets, and infrastructures and thus in a contingent manner. The development of new technical products and large technological systems happens not only inside companies and engineering: a broader organizational field in which innovations are developed, marketed, and used is also considered. This includes public administrations, research funding organizations, and research institutions, as well as political actors (Geels, 2005b: 446; Kirchner and Ruhrort, 2014). Each of these groups of future-makers acts in relative autonomy, pursues different goals and problem perceptions, and produces different future imaginaries.

Through the lens of urban future-making (Grubbauer et al., 2024b), in the following we will focus on UAM as a technological future; in doing so, our aim is to understand which actors and strategies are at play, what kind of coalitions seem possible, and which forces have the potential to facilitate or hinder the

breakthrough of UAM and air taxis in their envisaged form. In our contribution, we examine these questions from an interdisciplinary perspective, drawing from engineering transport planning and social science mobility research. The starting point is the assumption that the technological futures currently represented in the form of UAM are part of an implementation strategy that is competing with other imaginaries of future transportation. Visions of future technologies provide information about the present and the current interests of various stakeholders. Accordingly, issues around the technological developments, actors, interests, and contingencies are at the centre of our analysis. We focus mainly on Germany but also consider developments from other countries and continents. In this chapter, we first use the historical developments of automobility, as well as the Transrapid maglev train and urban elevated cabin systems, to demonstrate the contingency and unpredictability of such technological innovation processes. Then we present the status of the technical development of UAMs and the role of various actors, after which we discuss barriers to and possible scenarios for successful implementation. We then conclude that different further developments are conceivable that may have little to do with the image of urban air taxis in the context that is currently being discussed.

Technological innovations, politics, and contingencies: Historical analogies

The complex network of actors and socio-economic contexts that are part of the success or failure of technological innovations becomes apparent in retrospective case studies of past technology futures and their actual developments. As an illustration, we briefly sketch two historical cases of successful implementation and failure of an innovation in transportation: the history of the car and the successful establishment of automobility as the hegemonic transport regime, versus the history of the Transrapid and cabin taxi, which were ultimately failed innovations. Both analogies contain analogies for the possible development of UAM.

Analogy 1: Automobility as successful innovation in an unforeseen form

The history of the car contains interesting analogies to the current development of eVTOLs. In retrospect, it looks as if the car was developed at just the right time to meet a growing demand for individual mass transportation

that horse-drawn carriages could no longer fulfil. Yet, historical studies by Geels (2005a: 455ff) and others show a much more differentiated development. Largely unknown is the simultaneous development of various means of transport for the growing cities in Europe from the middle of the 19th century: horse-drawn taxis, horse trams, and bicycles. Thus, various new technologies initially existed alongside each other. Better roads proved important for the further development of urban transport but were frequently resisted by residents. The first electrically powered cars also date from this period around the turn of the century (Sauter-Servaes, 2011). Cars with combustion engines were unsuitable for urban transport at that time. Such cars were initially used in the niches of motor racing and as vehicles for trips to the countryside taken by wealthy citizens. It was not until the 1920s and '30s that in the US and Europe, the private internal combustion car became an urban vehicle competing with the tram on a substantial level. This is the point at which a socio-technical regime of automobility was being established (Paterson, 2007; Manderscheid, 2014). Its spread was accelerated by a car lobby which, though small, was supported by political actors (Kuhm, 1997; Norton, 2008). In Germany, the mass motorization of the post-war period was promoted by the state through tax incentives. From 1960 onwards, the tying of the mineral oil tax to road construction created a mechanism through which the spread of the car at least co-financed its own infrastructure and thus what the MLP refers to as the landscape (Canzler, 2014: 61f.). Also politically motivated, the dismantling of rail-based public transport took place in Germany, the United States, and many other industrialized countries even before the majority of the population were car owners (Knie, 2007: 51f.; Norton, 2008).

In the context of UAM, this historical case of combustion automobility reveals several contingencies: There is no linearity between the technological development of the combustion vehicle nor the VTOLs and their use as a means of transport on publicly financed roads or vertiports, state regulation of transport, within a developed landscape of automotive or UAM infrastructures (Urry, 2004). The historical innovation of automobile technology took place independently of improvements to road surfaces, which were first implemented to facilitate the movement of horse-drawn trams and bicycles. The use of combustion cars as expensive leisure vehicles at the beginning of the 20th century did not suggest use as a normal means of everyday transport. And finally, the new vehicle was by no means enthusiastically accepted by the population. There was great resistance in many North American and Euro-

pean cities to the subordination of road space to the flow of automobile traffic (Norton, 2008).

At present, self-driving cars are considered the 'next big thing' in automobile road transport. Interestingly, the vision of autonomous cars is only a little younger than cars in general and dates back to 1925 (Möser, 2009: 400f.). For more than 80 years already, the introduction of driverless cars into everyday life and motorized traffic has been promised to happen in about 20 years (Kröger, 2014). Some promising trials took place already in the 1950s. In the 1990s, both the US federal government and the European Union funded research programmes on the further development of self-driving cars. Also, not only the automotive industry has been involved in research on this topic. In 2017 the IT company Google also launched an autonomous vehicle on the road with the Waymo car. Different actors in the development process are producing different imaginaries of self-driving futures (Manderscheid, 2018). At present, it seems to be the imaginary of the robotaxi that generates strong momentum as a flexible form of public transport also in the face of a shortage of driving personnel. In addition, the automation of vehicle technology is already taking place on a large scale: from cornering assistance systems and parking aids to lane-keeping systems and adaptive cruise control, new vehicles already contain many automated technologies. These technologies are also being transferred to other contexts, a phenomenon that is also taking place in the field of eVTOLs.

Analogy 2: Transrapid and urban cabin taxi systems as unsuccessful innovation

Transport history shows that new vehicle technologies are not automatically used on a large scale. In Germany, the best-known examples of failed groundbreaking innovation in transportation are the Transrapid maglev train and the urban cabin taxi systems. It is interesting to compare these to UAM because in all cases the hope has been that introducing another level of transportation would solve traffic problems. The failed examples demonstrate that the importance of infrastructure and competition with existing modes of transportation should not be underestimated. This is a lesson that is also relevant for UAM. In Germany, in the second half of the 20th century, the development of magnetic levitation (maglev) technology was funded by the federal government for several decades through the Transrapid train programme. Various route options were considered for the Transrapid but never realized: Hannover–Hamburg,

Berlin–Hamburg, and Munich City–Munich Airport (Menius, 2024). After an accident on the test track in Emsland in 2006, there were no further plans, and existing plans were never realized. Also, the economic policy argument became more important over time. In the end, this was mainly about the exportability of the product, which – according to the argument made at the time – required a use case in Germany. Although a line was built as an airport connection in Shanghai, the technology was unable to establish itself internationally, even though the Transrapid had no competition from any well-developed high-speed rail network. There was a parallel further development of high-speed trains on conventional rail infrastructure, thus the Transrapid would have been an isolated solution in view of the existing rail infrastructure (Büllingen, 1997).

At the same time as the development of the Transrapid as a technology for long-distance transport, there was also a development of elevated cabin taxi systems (often referred to as people movers, and exemplified by the German cabin taxi project) for urban areas, which have also not caught on. At best, these have been a niche application, established at airports as a connection between different terminals. The original idea was to use automated individual cabins, and the aim of the development was to meet the individual demand for transportation, which the car fulfilled, with collective means of transport in order to reduce traffic jams and environmental pollution in cities (Schmucki, 1997). Their small number of seats was intended to suggest an individual vehicle. The operational reliability of public transport was claimed as the most important feature of these new systems, and their electric drive was to reduce emissions. Cabin plans became larger and larger during development, but even the large cabins were not used, and the development of the cabin taxi system was terminated in the 1980s. Without the considerable funding of the Federal Ministry for Research and Technology (BMFT), development of these vehicular systems would not have been possible for companies (ibid.), but in the economic situation at the end of the 1970s, municipalities did not have the necessary funds to invest in the new application. At the same time, however, the federal government financed the upgrading of existing local transport systems, resulting in the further development of trams into (partly underground) light rail systems. The new elevated cabin systems were unable to assert themselves in this competitive situation, also because there were doubts about their integration into the urban landscape and their acceptance by passengers, due to the need to change trains and the unfamiliarity of their automatic operation. Schmucki

(1997: 166) sums up, 'the new systems thus failed to a certain extent due to the advantages of their own concept'.[1]

Another strategic failure was that the routes planned for the cabin taxi system implementation already had existing transport alternatives, so the elevated cabin system offered no independent advantage. Even the argument of introducing an additional level of traffic, above existing routes and thus with low land use, has so far not been enough to help the Transrapid or urban elevated cabin systems to achieve a breakthrough. This is interesting because many promises made by cabin taxis and UAM companies are similar. The high cost of adapting infrastructure and implementing new infrastructure generally limits developments where vehicle technology is the focus. The existing infrastructure, which has grown over decades, has costly adaptation requirements that lead to limitations. Applying these insights to UAM, we see that here, too, many images have been produced in which the new vehicle technology is in the foreground but the complexity of the infrastructure requirements, and thus the establishment within existing urban structures, is underestimated. Another reason for the failure of the earlier transport innovations was that improvement of the existing modes of transportation took place at the same time.

UAM development and stakeholders

Against the background of these historical cases – of new vehicle technologies and their unforeseeable implementation as an individual motorized transportation system, as well as of the failure of a technologically more efficient railway system – we will try to disentangle the current developments, actors, and imaginaries around urban air mobility (UAM) as a present technological future. The development of UAM is taking place at different places and is pursued by different actors who, as will be shown, presently appear to be only partly connected with each other.

The European Union Aviation Safety Agency (EASA, 2021: 3) defines UAM as 'an air transportation system for passengers and cargo in and around urban environments'. This plain definition stands in contrast with the imaginaries of other organizations, such as that of the International Forum for Aviation Research (IFAR, 2023: 53), which is imbued with desirable properties:

1 Non-English quotations have been translated by the authors.

'The vision of a safe, efficient, convenient, affordable, and accessible air transportation system for passengers and cargo that revolutionizes mobility around metropolitan areas.' UAMs are based on a combination of distributed electric propulsion and vertical take-off and landing (VTOL) technologies. UAM can also be developed as autonomous systems without the need for a human pilot (for example, autonomous eVTOL aircraft). A pilotless aircraft, commonly referred to as a drone, is formally known as an unmanned aerial vehicle (UAV). The distinction between urban air mobility and unmanned aerial vehicles is often blurred in discussion, though the two should be seen together since they refer to many of the same technological features. Several applications for drones exist. As smaller pilotless aerial vehicles, they are used for surveillance and data collection, among other things. UAM is often seen as the logical next step, on the assumption that legal frameworks and regulations for the use of airspace are already being developed and adapted for drones. However, the specific applications of drones is less complex than the establishment of a new mode of transport with much higher infrastructure requirements.

Establishing UAM as a transport system would require setting up air traffic control (U-space) and vertiports for take-offs and landings. U-space encompasses the development of technology for the safe operation of unmanned aircraft and UAM, and it includes geofencing, flight approval, tracking, interfacing with conventional air traffic control, and assistance for conflict detection and automated detect and avoid functionalities (SESAR, 2020). Vertiports, on the other hand, comprise the airfield for vertical take-off and landing, as well as the passenger terminal and the necessary space for aircraft handling and ensuring that the airspace is free of obstacles. The time required for the necessary charging process for eVTOLs reduces the capacity of vertiports. It is estimated that to handle UAM vehicles for around 100 passengers per hour, the size of a football field is required (Plötner et al., 2022). To date, most concrete plans for vertiports in urban areas are based on a single-digit number of vertiports, meaning that the connections they would enable would be regional in scope. For example, plans for Dubai have four vertiports – Airport, Palms, Marina, Downtown (Smith, 2024) – and plans for the Bay Area in California include South San Francisco, Napa, San Jose, Oakland, and Livermore (Archer, 2024). Moreover, the weather has an impact on operating times, thereby shaping the potential use and reliability of eVTOLs as a means of transportation in urban regions. Conventional weather monitoring does not yet provide the detailed real-time information required for safe operation. Current studies are therefore investigating how buildings and other urban structures influence wind.

Based on this, local weather prediction models are being developed to provide important information on how and where UAM flight routes can be planned to minimize adverse wind conditions and ensure safe operation (e.g. Kim et al., 2025; Shah et al., 2025).

At the centre of transport innovations around UAM is the technological development of the vehicle or aircraft. Typically, this takes place within corporate companies and is rooted in the flow of private and public capital. In Germany, two start-ups, Lilium (founded in 2015) and Volocopter (founded in 2011), together with Airbus as a major manufacturer of commercial aircraft and helicopters, have developed UAM vehicles. Both start-ups had to file for insolvency at the turn of 2025 (Tagesschau, 2025), and Airbus has announced that it is pausing its own eVTOL project (Hildebrandt, 2025), citing the challenges in battery technology, where progress in recent years has not been great enough, especially as vertical take-off consumes a lot of energy. In its Advanced Air Mobility Reality Index for February 2025, the US firm SMG (SMG Consulting, 2025) lists more than 20 companies worldwide that are currently developing vehicles, with a strong geographical concentration in the US and China. Almost all these companies have received investments in the triple-digit million (USD) range or more. The so-called AAM Reality Index, with 5 indicators, lists the highest rated vehicle at 8.5 on a scale of 0 to 10 (ibid.).

In this context, the white paper entitled *Fast-Forwarding to a Future of On-Demand Urban Air Transportation*, published in 2016 by Uber, the service company which operates digital platforms for passenger transport/ride-hailing, has attracted attention. Under the company name Uber Elevate, the company planned to offer a network of eVTOLs as an on-demand service in the US (Davis, 2016; Eisenstein, 2020). However, Uber's involvement ended in 2020 (Eisenstein, 2020). The aviation technology developer Joby Aviation took over this division from Uber with a simultaneous investment of USD 75 million from Uber and is still working on an air taxi service in the US (Joby Aviation, 2020). This means that a prominent interface between aviation and the eVTOL community and the urban transport market has been closed after just a few years. To date, there are no transport companies or mobility providers with experience in the urban sector in Europe that have made a name for themselves as potential providers in the UAM segment.

In addition to private investors, the state is also an actor in UAM development through research programmes. For example, in Germany, the Federal Ministry of Digital and Transport (BMDV) is promoting the development of drone technology (BMDV, 2022) and the Federal Ministry of Economic Affairs

and Energy (BMWE) has been supporting numerous projects in the field of UAM for several years as part of the Aviation Research Program (LuFo). The development of UAM vehicles is not directly funded, but the focus is on developing technologies in the pre-competitive sector, with a strong emphasis on promoting technologies for climate-neutral aviation. In some federal states of Germany, there are supplementary research networks funded by state funds (e.g. the Innovative Airborne Urban Mobility [i-LUM] project is funded by the Hamburg State Research Fund). Since 2023, the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) has been funding an interdisciplinary research training group at TU Dresden: Technical and Operational Integration of Highly Automated Air Transport in Urban Areas (RTG 2947, 2023). Research on UAM is, thus, firmly anchored at universities and national research organizations for aerospace (e.g. DLR in Germany, or NASA in the US).

To date, municipal urban and transport planning and the companies and research networks for the development and promotion of UAM have been separate specialist areas with little exchange. As a result, there are no cities in Germany that are strategically considering the integration of urban air mobility into their transport system or planning vertiports. The profiling of four model regions in Germany (Aachen, Ingolstadt, Hamburg, Nordhessen) with a 'Memorandum for Smart Cities and Regions' by the Federal Ministry of Digital and Transport (BMDV et al., 2021) is primarily derived from industry and research funding. The report's 'declared goal is to develop Germany into the leading market for the drone industry and to bring safe, automated and networked flying into practice' (ibid.: 2). the four German model regions are in turn part of the European Commission's UAM Initiative Cities Community (UIC2), a network of 46 European cities.

The UIC2, established in October 2017, is a community 'that brings the voice of European cities and regions into the emerging sector of urban air mobility. Its mission is to drive the sustainable and responsible transition of urban mobility to the vertical (third) dimension' (UIC2, 2021: 6). With their practitioner briefing (UIC2, 2021) the initiative tries to link both communities. They stress that the introduction of UAM calls for a holistic planning approach: 'Cities typically face the following strategic decision regarding UAM: how innovative do we want to be as a city (in general), and how can new services like UAM and their underlying enabling technologies contribute to our urban innovation strategy?' (ibid.: 15). All the efforts made by the cities involved in the research projects are indeed linked to the general objective of strengthening

their own local aerospace-related economies and enhancing a positive image by demonstrating openness to new technologies.

Scenarios and obstacles for the future of UAM

Having outlined the developments in aircraft development, infrastructures, business models, and research and development funding, we will now discuss possible further developments in UAM technologies.

Automated vehicles, electric cars, and mobility as a service are modifications of existing modes of transport and can therefore be understood as incremental innovations within the regime as understood by the MLP model (Geels, 2004; 2005a). Urban air transport systems, on the other hand, would fundamentally expand the portfolio of urban modes of transport for the first time since the introduction of the automobile over a hundred years ago. There are therefore no empirical data from which such a fundamental change in mobility offerings could be predicted, especially as the possible range of urban air transport options still offers numerous variations. The scientific projects on urban air mobility therefore work with scenarios. Thus, our aim here is not to point out probable and improbable developments, but rather to illustrate the wide range of possibilities and the contingencies involved.

Crucial for the success of innovations in transportation are infrastructures that accommodate the new vehicles. For the safe and reliable usage of petrol-powered cars, the improvement of road surfaces and the expansion of a road network were decisive (Geels, 2005b; Kuhm, 1997). The examples of Transrapid and the urban cabin taxi system, on the other hand, shows that the construction of a new rail network in addition to the existing one for trains and trams represented a comparatively high hurdle for the introduction of this new means of transport.

The integration of vertiports as new infrastructure in an historically grown urban fabric faces several obstacles and may lead to a whole range of conflicts. Often, vertiports are envisioned to be on top of existing buildings. Yet, since passengers must be able to access them, an integration into ground-level public or private transport systems is necessary. Especially densely built European cities already face a scarcity of space. Public resistance to an increase of traffic and corresponding noise emissions from the starts and landings of eVTOLs is to be expected, and the location of maintenance facilities is also important. Furthermore, requirements relating to emissions control, obstacle clearance,

air traffic control, and planning law, as part of the necessary immaterial infrastructures, play a particularly important role here.

Extensive planning requirements and high levels of structural investment lead to the still largely open question of who can be considered as an investor and operator for vertiports and UAM air traffic control. There are basically two options. Under the airport principle, the facility is available to different providers on a non-discriminatory basis. This would require a commitment from the public sector, but it is completely open whether a vertiport could be operated from user charges or would remain a 'subsidized business'. In the case of operator-specific systems, a provider would be required to finance both its own vehicle fleet and the infrastructure, which constitutes a very high barrier to market entry.

Several start-ups and airport operators with subsidiaries specializing in the implementation of vertiports do, however, exist (for example Skyports in the UK, and UrbanV, a subsidiary of several Italian airports). In Germany, concrete plans for subsidized projects have so far only been made for Ingolstadt and Munich (with Munich Airport as a project partner). The roofs of multi-storey car parks have also been examined as a possible UAM location as part of funded projects (a visualization by Goldbeck, manufacturer of system car parks, states: 'We make multi-storey car parks vertiport-ready' [Goldbeck, 2024]). Nevertheless, there are still no operator concepts for the infrastructure development of vertiports and U-space.

Urban air transport is envisioned as an intermodal system in which different modes of transport must be combined on one route. Transit mode changes at the vertiport thus influence the total journey time, so that a time advantage over car use would only occur either for longer distances or in congestion situations (which is often argued in manufacturers' presentations).

In principle, urban air transport systems make it possible to cover distances more quickly than today's means of transport (car, public transport). Yet, research keeps showing again and again that every acceleration of the transport system, via faster means of transport or new transport infrastructures, has in the past led to an expansion of the areas of action and thus, in sum, to an increase in traffic. The aggregated daily travel time budget has remained unchanged for decades (Zahavi, 1979). Accelerations in the transport system therefore do not lead to travel time savings, but in the long term to other location decisions with longer distances. This effect must also be expected in the case of urban air transport systems. While UAM holds the potential to improve accessibility to remote regions, it can in the long run (together with

possibilities to work from home [e.g. Helmrich and Manderscheid, 2025]), also impact residential location choices, with people moving to more rural areas with affordable housing (Straubinger, 2024). Thus, longer commuting distances and leisure journeys could be the consequence of UAM, as peripheral areas could be reached more quickly via air transport. By this token, the consequence of a broad implementation of UAM could lead to urban sprawl, a further expansion of action areas, and induced traffic, i.e. traffic that is only made possible by a new transport option. In addition, it would aggravate environmental injustice with certain population groups being more affected by noise and additional road traffic than others. This is particularly true given that parts of society would be unable to use the new transport services because of their prohibitive costs (Plötner et al., 2022).

Due to the higher energy consumption of eVTOL vehicles, the use of electric cars on the same route is less energy-intensive and leads to lower CO_2 emissions under the current electricity mix. Leaving aside the potential effect of longer distances and induced traffic, UAM can only make a minor contribution, if any, to the decarbonization of the transport system; positive effects on CO_2 emissions would only be seen in comparison to cars with combustion engines (Plötner et al., 2022). No added value of UAM in terms of climate protection is to be expected compared to other modes of transport. As the transportation needs of large cities can only be met with the help of systems capable of handling mass transportation, the addition of a further level of individualized (air) transport would not necessarily lead to a solution for city and regional transport problems.

Up until now, there are no cities in Europe that have already developed a strategy for integrating UAM into their transport system. The present reticence in transportation and city planning certainly has to do with the fact that actual implementation still seems a long way off. At present, in European cities there is much more concrete discussion of autonomous driving for road transportation. From today's perspective of urban planning, UAM offers no definite breakthrough for specific transport planning objectives. To put it simply, the industry is looking for its market, and thus areas of application, while urban and transport planners do not (yet) perceive the expected product as a problem-solver.

However, these issues look very different internationally. Whereas the European city with its dense historical structures hardly seems compatible for the integration of a large number of vertiports, such infrastructure is much more conceivable in rapidly growing cities with urban sprawl and a strong focus on

the car, as in Dubai or China. Other mechanisms of planning enforcement, as well as technological euphoria and a high level of openness to new business models, are present in such places. There is also more of a self-assured belief that the early adoption of modern technology contributes to the positive image of a city.

The designs, models, and prototypes of vehicles shown by eVTOL companies so far have focused on technical feasibility, whereas descriptions of areas of application remain rather vague. The types of eVTOLs currently being developed are, for example, designed to accommodate two to eight people. The small size of the aircraft, its energy usage, and its infrastructural prerequisites imply operating costs which suggest that eVTOLs are envisaged as a means of transport for small groups of an affluent segment of the population. In the literature that deals with this topic, UAM is usually conceived as a taxi service or ride pooling service and not as a future means of private transport. In fact, the idea of air taxis is not new: between 1950 and 1980, for example, helicopter services existed in the US between major cities such as Los Angeles, San Francisco and New York, but they could not be operated economically due to fuel prices and safety issues (Cohen et al., 2021; Garrow et al., 2021). In the cities of South America, e.g. Sao Paolo, various helicopter services are still in operation, allowing a wealthy elite to escape security problems and traffic congestion on the ground (Cwerner, 2006). In connection with eVTOLs, taxi services for individuals or groups, or ride pooling services for multiple individuals, are currently being discussed as a form of UAM operation (Cohen et al., 2021: 6078). In the literature on UAM, cities identified for the use of UAMs are selected according to feasibility and regulatory support (Spühler et al., 2025): efficiency and costs for different business models of air taxis are weighed against each other (Hae Choi and Park, 2022), as are calls for measures to increase public acceptance of UAMs (Babetto et al., 2023).

Further possible uses of UAMs have been discussed from the outset as feeder services to airports (Hae Choi and Park, 2022; Lv et al., 2024a; Jang et al., 2025). In other visions, UAM appears as a future form of commuting in metropolises (Rimjha et al., 2021; Hwang and Hong, 2023), especially for high-income groups and for business trips by highly paid managers and executives (Al Haddad et al., 2020; Hae Choi and Park, 2022; Babetto et al., 2023; Jang et al., 2025). So far, batteries have determined the length of possible travel distances, but it is also assumed that longer distances and thus also inter-city connections will become possible in the coming years (Garrow et al., 2021: 2). Other possible applications discussed in the literature include overcoming

spatial barriers (rivers, differences in altitude); offering tourist services such as sightseeing flights; connecting peripheral locations (holiday areas, hard-to-reach places of work) to large cities; providing surveillance and rescue services; and supporting security operations (police) as well as military uses. The use of UAM for freight transport and logistics is discussed much less prominently in the literature (Applin, 2016). With these niche applications, eVTOLs would resemble the introduction and operation of helicopter services that are permanently active in a small segment centred around medical, military, and surveillance flights.

It is surprising that, even though it is becoming apparent that the effect on mobility will be minimal, so much energy is still being poured into further UAM development. There is a belief that there is still a relevant market, even if it will be spatially focused on certain regions. UAM will not be a game-changer for (urban) mobility; nevertheless, there can be successful business cases within the UAM and civil drone sectors or cargo, supporting services, and medical and emergency applications (Plötner et al., 2022). Applications relevant to society, such as rescue operations or medical transport, could open the door to other markets. Possible applications for UAM could be in regions with particular geographical features such as rivers or islands, or as airport shuttles, or for user groups with a high willingness to pay, such as tourists.

Two particularly interesting questions are whether the leap in scale from unpiloted drones to UAM will succeed in terms of vehicle technology, and whether UAM can provide an impetus towards normal aviation. So, we may see a growing number of drone applications. With the war in Ukraine, the use of drones as weapons of warfare against urban populations has come to the forefront of public attention. In the civilian sector, drones are envisioned to play a role in improving the delivery or supplies to peripheral regions in the future. The German Federal Ministry of Digital and Transport, for example, has formulated such a vision:

> Drones are among the technologies that can make our lives noticeably and sustainably better. Autonomous, intelligent, and highly efficient aircraft help us, for example, to organize rescue operations more efficiently, collect environmental data, and supply rural areas quickly and reliably with everyday products. (BMDV, 2022)

Even if UAM will not prevail, the research on it will provide an important impetus for the electrification of air transport in general. It is likely that the re-

sults of UAM technology development can be transferred to the further development of other technological innovations. This is likely to be in the military sector, but certain technologies may also influence areas such as sensor development, communication, air traffic management, or methods for modelling wind in urban areas. In this respect, it is understandable that UAM research continues even though there are no signs of a breakthrough as a new urban transportation system. Nevertheless, further impetus for aviation and general technological development is to be expected, even if the exact impact cannot be predicted at present.

Conclusion: Interdisciplinary considerations

The discussion of current developments in various fields, seen against the background of the MLP social science approach on innovation and the history of technologies, highlights that the field of UAM, at present, is characterized by many contingencies in regard to the development, promotion, and implementation of new technical means of transport, infrastructures, possible uses, and urban planning, as well as to political interests and room for manoeuvre. The analogy with the automobile shows that development paths from the invention of a new vehicle are not linear, and transport regimes cannot be planned and predicted in advance. Especially the analogy with the Transrapid maglev train and urban cabin taxi system shows strong path dependencies due to the existing transport systems and the high costs for necessary infrastructure, which are underestimated in the actual technological development of UAM. The realization of vertiports, for instance, is complex and associated with numerous conflicts of use, and there are still numerous technical challenges with eVTOL vehicles themselves. On the level of city governance, the contribution of UAM for solving urban transport problems appears rather small. At present, only a small wealthy elite would realistically benefit from this innovation. At least in democratic countries, the justification of large public expenditures for such infrastructures, as well as the elaboration of regulations for urban flight systems, is difficult. It is also plausible that UAM will only be used for specific niches such as tourist sightseeing flights or for a few selected routes that address specific geographical barriers. Geographical differentiation in application would also be possible, as urban spatial structures vary greatly around the world.

The analysed case of the eVTOL makes it clear that the line of development from a technological innovation – the electric vertical take-off and landing aircraft – to its establishment within the urban transport system, and thus to a specific urban future, is by no means straightforward but is characterized by a variety of contingencies. The development of the aircraft is already accompanied by ideas about what can be transported with it (small groups of people) and in which environment it could be used (large cities). Yet how, to what extent, and in what form the infrastructure (vertiports) can be set up; how air traffic in cities is organized in regulatory terms; which routes will be established; which operating models can be implemented; at what prices flights can be offered; whether a political will exists in the city to establish an additional exclusive transport system; and which urban, social, state, and supranational objectives will become effective cannot be thoroughly planned out or predicted.

The case of UAM also shows the double-sided nature of contingency: Although UAM seems too complex and expensive, lacks a relevant demand in European cities, and is incompatible with sustainability goals, this does not mean that its technological innovation will not become established in the material urban world.

The historical cases of vehicle technology developments used as analogies – the car, the Transrapid, and the cabin taxi system – illustrate that the possible applications presented at their beginning had little to do with the historical course of their socio-technical development. Accordingly, it would be too short-sighted to simply derive probabilities for the realization of a technology from the visions of the future formulated by the players currently involved.

Engineering sciences focus primarily on feasibility and technological developments. In such frameworks, society can appear to be more as an obstacle to innovation, meaning that social acceptance must be established in order to disseminate technological innovations. Questions regarding social benefits, socially unequal effects, and impacts on urban and ecological environments tend to be peripheral considerations. Social sciences, on the other hand, typically analyse the effects of new technologies, the socially unequal processes of adopting new technologies, and the form of their integration into everyday lives. In doing so, social science research tends to ignore ongoing technological developments such as the current UAM, assuming its implementation is unrealistic in its currently envisioned form. These respective blind spots underscore the necessity for an interdisciplinary perspective on transport innovations and imaginaries of mobility futures.

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Negotiating Objects and Creating Matter

8. Contingencies in rooftop extensions on multifamily buildings from the 1950s and 1960s in Hamburg

Kathrin Meyer

Context and ecological relevance of rooftop extensions in post-war housing stock

Post-war housing stock in Hamburg, particularly from the 1950s and 1960s, represents one of the most widespread and structurally homogeneous settlement types in many German cities. These buildings are increasingly coming into focus as both a challenge and an opportunity for urban transformation, due to their ecological footprint, aging materials, and socio-spatial implications. Accordingly, a growing body of research has addressed their transformation potential, often emphasizing participatory, social, and design-based strategies for adaptive reuse (Simon-Philipp and Hopfner, 2013; Harnack et al., 2020; Brunner et al., 2021; Kaufmann, 2024). While these perspectives have provided valuable insights into how post-war settlements might be reimagined, they often assume that transformation is materially and structurally feasible.

The aim here is not to assess architectural or social relevance of these settlements but to explore how technical and informational contingencies shape the feasibility of one specific intervention, namely densification through rooftop extensions. In doing so, this chapter contributes to a broader understanding of urban transformation under conditions of uncertainty. It draws on the conceptual lens of urban future-making, which emphasizes that desirable futures emerge not through linear planning but through negotiation, friction, and material contingency. In this light, the question is not whether rooftop extensions are desirable but under what conditions they can realistically be implemented.

Climate change and the scarcity of natural resources demand a transformation of the building sector that both reduces greenhouse gas emissions and limits the consumption of new materials and land. In Germany, the goal of achieving climate neutrality in building stock by 2045[1] must be addressed alongside the challenge of providing additional housing. Over the past years, strategies for the densification of existing buildings have gained attention in both research and policy discourse (see, among others, BBSR, 2014; BSU, 2013; Nitschke, 2023). Among these strategies, rooftop extensions are increasingly viewed as a promising approach, as they enable the creation of additional floor space without further land take and are often combined with energy-efficiency measures (BBSR, 2016; Tichelmann et al., 2016).

From an ecological perspective, rooftop extensions offer several advantages. They allow for the use of existing structural components, significantly reduce the need for new construction materials, and help avoid demolition waste. When combined with retrofitting measures such as improved insulation, window replacement, and the installation of low-emission heating systems, rooftop extensions can contribute to a considerable reduction in the operational energy demand of a building. In comparison to demolition and new construction, they typically result in lower environmental impacts across the building life cycle (Hafner and Storck, 2023).

Multifamily buildings from the 1950s and 1960s are particularly relevant in this context due to their high prevalence. According to the 2018 German housing microcensus *Wohnen in Deutschland* conducted by the Federal and State Statistical Offices (Statistische Ämter des Bundes und der Länder, 2020), approximately 16.7 million apartments are located in buildings constructed between 1949 and 1978, of which around 10.5 million are in multifamily buildings. This represents around 42% of the total housing stock (or 26% of multifamily buildings). A significant number of these structures were built before the introduction of the first German Thermal Insulation Ordinance (Wärmeschutzverordnung [Wärmeschutz V]) in 1977 and have undergone relatively low levels of modernization (BSW, 2023). Multifamily buildings from the 1950s and 1960s therefore offer significant potential for densification as well as energy efficiency improvements, as their outdated construction methods and insufficient insulation result in high energy consumption and heat loss (BBSR, 2016). Tichelmann et al. (2016) assume that multifamily buildings constructed between 1950 and 1989 generally possess the structural

1 §3, Paragraph 2, Bundes-Klimaschutzgesetz.

conditions for rooftop extensions. Specifically, buildings from the 1950s and 1960s exhibit the greatest potential for future rooftop extensions due to their technical and structural characteristics (BBSR, 2016). Advantages include simple structural systems with short spans, sufficient load-bearing reserves in existing structures, adaptable construction methods, façades with uncomplicated geometries, and a general need for thermal insulation improvements (BBSR, 2016).

While such studies highlight the considerable theoretical potential of rooftop extensions, more recent practice-oriented publications identify substantial barriers to implementation. As noted by Fath et al. (2019), the frequent absence of reliable structural documentation significantly complicates the assessment of load-bearing capacity and introduces major planning uncertainties. These include difficulties in estimating costs, securing regulatory approval, and coordinating construction logistics. In many cases, the lack of trustworthy information about the structural condition of existing buildings leads to increased complexity in the early planning phases. This can result in time-consuming and costly clarification efforts, which may discourage stakeholders from considering rooftop extensions as a viable option. The contrast between strategic potential and implementation barriers highlights the need for a more differentiated understanding of the conditions under which rooftop extensions can be realistically pursued.

This discrepancy between the widely discussed strategic potential of rooftop extensions and their limited realization in practice forms the starting point of this chapter. Rather than asking whether such extensions are feasible in principle, the chapter investigates the structural and informational contingencies that influence the applicability of the extensions to the most prevalent type of post-war multifamily buildings. It does not evaluate rooftop extensions as a planning instrument; instead, it focuses on how the availability and reliability of building documentation affect whether rooftop extensions are considered a realistic option in early planning stages. The aim is to better understand why a densification strategy that is often discussed in research and policy as ecologically and spatially promising remains difficult to implement in practice. In this sense, the chapter contributes to a grounded understanding of how urban futures take shape through material conditions, shaped in turn by the enabling or constraining fabric of the past.

Methodology and data

Research background and analytical framework

This chapter builds on the findings of its author's ongoing doctoral research, the first phase of which analysed the quantitative potential of rooftop extensions on buildings owned by housing cooperatives in Hamburg. Based on a typological classification and the evaluation of available building documentation, supported by the interpretation of digital maps and aerial imagery, the study found that a large number of buildings in the city appear formally suitable for extension. The theoretical densification potential was substantial: Up to 14,588 additional apartments could be realized through two-storey extensions within the cooperative stock alone, corresponding to more than one year of Hamburg's annual housing demand (Meyer and Klotz, 2023).

However, a more detailed structural analysis revealed a considerably more limited technical feasibility. Most buildings showed very little structural reserve in their foundations; in many cases, the available strength calculations indicated utilization rates between 90 and 100%. Accordingly, extensions could only be realized with additional reinforcement measures such as underpinning the foundations (Meyer and Klotz, 2023). These results challenge the widespread assumption that post-war buildings generally provide favourable structural conditions for rooftop extensions (BBSR, 2016; Tichelmann et al., 2016).

Beyond structural capacity, the availability and quality of existing building documentation emerged as a key constraint. In practice, the early exclusion of extension options is often linked to the absence of reliable information about the load-bearing structure. These findings point towards a complex set of interrelated contingencies that influence the feasibility and planning of rooftop extensions.

The analytical framework developed in this chapter is based on a literature review, empirical document analysis, and planning practice insights. First, existing studies on post-war buildings, rooftop extensions, and structural planning formed the conceptual foundation. Second, original data was collected between 2020 and 2023 through archive research, consultations with public authorities, and engagement with housing cooperatives. Third, a comparison of these findings with current planning instruments and professional discourses informed the categorization of planning contingencies. This triangulated approach allowed for the identification of recurring challenges

across different stages of the planning process and for the development of an analytical lens that connects structural-material conditions with actor-based decisions and systemic constraints.

Building on this methodological basis, a conceptual framework is introduced that differentiates between two interrelated analytical perspectives: the characteristics of the existing building stock, and the ways in which planning actors respond to them. These perspectives are further specified through four closely connected types of contingency. The first two concern the conditions of the building stock itself, namely (1) material and structural heterogeneity, and (2) insufficient, inaccurate, or incorrect building documentation. The latter two refer to how these conditions are addressed in practice, through (3) extensive case-by-case structural assessments and (4) the limited applicability of digital decision-support tools. These dimensions do not function independently but reinforce one another. For example, insufficient documentation may require costly and time-intensive structural investigations, which in turn reveal the limitations of typologically driven planning tools. Together, these interdependencies create a layered and cumulative complexity that shapes how rooftop extensions are planned and decided upon.

A particular emphasis is placed on the issue of building documentation. Not only did the research identify a lack of documentation as a practical barrier in many cases, but the status and accessibility of documents became a central lens for analysing planning feasibility more generally. In this sense, the investigation into building documentation was not merely a methodological precondition but part of the analytical approach itself. The research process made visible how the absence, ambiguity, or inaccessibility of information actively shapes planning decisions in early project phases.

Document retrieval and empirical basis

Between 2020 and 2023, documentation and information was collected from three main sources. First, a targeted search was conducted at the Hamburg Architectural Archive of the Hamburg Chamber of Architects (Hamburgisches Architekturarchiv der Hamburgischen Architektenkammer). This archive houses written records, architectural plans (including designs and construction drawings), photographs, and occasionally films. A database search conducted by archive staff under the criterion 'three- to four-story residential buildings' yielded multiple dataset lists corresponding to document collections from Hamburg-based architects such as Sprotte & Neve, Streb &

Tinneberg, and Matthaei, as well as records from former non-profit German construction and housing company Neue Heimat and municipal housing company SAGA GWG. However, the data provided insufficient information to determine whether the listed buildings met the study criteria. Where addresses were available, a preliminary selection was made using Google Maps and Google Street View. Subsequently, original construction drawings were reviewed in analogue format (Figure 1) and, if deemed relevant, photographed on a light table. The archive primarily contained design drawings from SAGA GWG construction projects. At the time of research, no digitized plans were available.

Figure 1: Review of existing building plans at the Hamburg Architectural Archive, 2020/2021.

Source: Author.

The second approach involved accessing the respective building records at the responsible building authority. This process requires a preselection of relevant buildings and written consent from the property owners. Additionally, access to these records is subject to fees. A request to the District Office of Eims-

büttel (Bezirksamt Eimsbüttel) revealed that building documentation was significantly reduced in the early 1990s across all building types, with strength calculations in analogue format being removed from the archives. These were offered to property owners for retrieval; in cases of non-response, they were destroyed.

Third, building documentation was obtained from four housing cooperatives. Two cooperatives provided digital plans, while another allowed access to original plans for digitization. A fourth cooperative facilitated on-site research through multiple visits, allowing examination of both digital databases and analogue archives. The collected building documentation included submitted building applications, construction drawings, and building descriptions. Most documentation consisted of scanned copies of originals, while some was later recreated as 2D CAD representations.

For each selected building, the research aimed to retrieve construction drawings, structural calculations and descriptive building documents. Nearly all of the 83 building datasets included complete construction drawings at a scale of 1:100, including floor-plans, cross-sections, and elevations. However, only 20 of these datasets contained original strength calculations. All documentation was evaluated with regard to completeness, clarity, and internal consistency. This data formed the basis for analysing how gaps in documentation affect the feasibility of extension planning, and why this dimension must be considered a core factor in understanding planning contingencies.

Structural heterogeneity, materiality, and urban development in the 1950s and 1960s

The structural variability of multifamily buildings from the 1950s and 1960s represents a crucial factor in assessing the feasibility of rooftop extensions. Although these buildings often appear similar in their architectural form, their construction methods, material composition, and load-bearing structures differ significantly. This heterogeneity is derived from the diverse conditions under which they were built, influenced by both post-war reconstruction efforts and evolving urban planning strategies. As a result, structural assessments for rooftop extensions cannot rely on uniform assumptions but must consider the specific construction characteristics of each individual building.

In the course of the 1950s, building development in Hamburg took a new direction. In the first half of the decade, most construction took place on inner-

city rubble sites. Many residential buildings were constructed on existing basement foundations, reusing established street layouts and utility connections, which provided an immutable framework for redevelopment (Stapelfeld, 1993: 173). The row scheme of the *Zeilenbau* became a defining feature of this period, as it aligned with contemporary urban planning goals that sought to move away from perimeter block structures in favour of more open and airy residential environments (Stapelfeld, 1993: 199). Since multi-storey apartment buildings were generally limited to three to four storeys, the four-storey *Zeilenbau* became the dominant residential building type of the 1950s (Stapelfeld, 1993: 199). This approach was primarily driven by economic considerations, as it enabled housing to be provided at the lowest possible cost to meet the pressing demand of the time (Kindt, 1969: 431). Beyond economic efficiency, this building typology also offered several functional advantages. With sufficient spacing between individual buildings and the arrangement of only two apartments per landing, the multi-storey *Zeilenbau* ensured a high level of sunlight exposure, natural illumination, and cross-ventilation for each unit, significantly improving living conditions (Kindt, 1969: 431). The low building density, reflected in a floor area ratio[2] ranging from 0.4 to a maximum of 1.0, further emphasized the planning approach of open, well-lit residential environments (BSU, 2013: 114). Additionally, the repetition of standardized house types facilitated greater efficiency in both planning and construction processes, allowing for a rationalized building execution (Kindt, 1969: 431). Alongside the introduction of the new *Zeilenbau*, ruins were reconstructed, damaged residential buildings were repaired, and new buildings were erected on the preserved foundations of pre-war perimeter block structures in their original layout. Furthermore, gaps within existing perimeter block structures were filled.

By the second half of the 1950s, urban development began to diversify. Settlement structures increasingly incorporated a mix of building typologies, including terraced houses, multi-storey apartment buildings, and taller point houses, resulting in a more varied cityscape (Stapelfeld, 1993: 173). Hans-Henning Buchholz and Ekko Flick (1969: 41) describe settlement groups composed of multifamily *Zeilenbau*, point houses, and single-family houses in recurring types. Large-scale residential estates emerged, with housing developments consisting of repeated building types arranged in clusters (Buchholz and Flick, 1969: 41). A significant shift in land utilization occurred during this

2 The floor area ratio is an urban planning metric that indicates building density by expressing the ratio of a building's total floor area to the size of its plot.

period: Whereas in 1955, 63.5% of new residential buildings were still being constructed on inner-city rubble sites, this share had dropped to only 17.4% by 1958. Conversely, the proportion of new housing developments on previously undeveloped land rose from 36.5% to 82.6% within the same period (FHH Baubehörde, 1959: 10).

The 1960s marked another transition in housing development, characterized by an increase in large-scale residential estates with higher densities. These projects were dominated by multi-storey social housing and were largely carried out by housing cooperatives. These institutions acquired land on the city's outskirts, where they implemented urban planning concepts that emphasized modern architectural principles and social considerations (Mramor, 1969: 235; Harms et al., 1989: 44). The resulting developments consisted almost exclusively of multi-storey apartment buildings designed to provide affordable housing on a larger scale.

The structural variability of multifamily buildings from the 1950s and 1960s is not only a result of differing urban planning approaches and construction methods but is also closely linked to the materials used. The postwar years were marked by both material shortages and rapid technological advancements, which led to significant changes in building practices. With the introduction of new materials and the rapid advancements in construction technology since the 1950s, existing standards and current building practices had to be fundamentally reconsidered. One major consequence was the reduction in wall thicknesses, as improved materials allowed for more efficient strength utilization without compromising stability (Gloede, 1969: 68). However, the need for better thermal and sound insulation increased at the same time. Achieving adequate thermal insulation became a central issue, particularly in relation to energy efficiency, as coal remained the primary heating source in Germany (Böckl, 1951: 4). Additionally, growing traffic volumes and the increasing presence of indoor noise sources, such as household appliances and home audio equipment, heightened the demand for improved soundproofing. The challenge was further intensified by the trend towards smaller apartments. With the continuous advancement of construction methods and materials, many building components became lighter than in previous years, which in turn made them more sound-permeable. Additionally, the new concrete ceilings did not provide sufficient sound insulation (Sautter and Brand, 1956: 3).

The increasing demands on residential construction inevitably led to higher material consumption and greater construction efforts. Concerns

arose that the high pace of housing production might decline despite continued demand. In response, rationalized and cost-effective construction methods were promoted to optimize efficiency (FHH Baubehörde, 1959: 9). In this context, rational and cost-saving construction methods developed alongside traditional masonry construction. These included the introduction of larger masonry units, such as brick and lightweight concrete blocks, as well as the so-called *Schuttbauweise*, a poured concrete method that incorporated rubble as aggregate. In addition to traditional bricks, alternative materials such as sand-lime bricks, slag aggregate concrete bricks, pumice stone bricks and brick concrete blocks, were increasingly used (Ahnert and Krause, 2009: 79).

Parallel to these developments, the prefabrication of reinforced concrete components became increasingly relevant. Although this method was consistently applied from the 1960s onwards, it did not entirely replace traditional masonry techniques but was instead used alongside them. In Hamburg, brick shell construction was regarded as the most weather-resistant solution for building exteriors. While plastered façades were introduced as an alternative, they were only considered feasible when significant cost savings outweighed the disadvantages associated with plaster construction (Hammonia Norddeutsche Verlagsgesellschaft mbH, 1953: 132).

Also, mandatory standards introduced for social housing set new benchmarks, such as floor-plans designed according to the dimensional coordination DIN 4172. This was intended to ensure that large-format hollow blocks or other building materials could later be installed without additional adjustments. Compliance with standardized storey heights according to DIN 4174 also facilitated the installation of stairs and utilities (Wandersleb, 1952: 73). The design of ceilings also underwent change. The previously common wooden beam ceilings with clay or slag infill were increasingly replaced by solid ceilings that met the new requirements.

The heterogeneity in material use and construction methods defines the first level of contingency in the assessment of rooftop extensions. The structural conditions of buildings from this period cannot be assumed to follow uniform standards but instead reflect the circumstances under which they were built – whether on pre-existing foundations in inner-city areas or as new developments on previously undeveloped land. The coexistence of different building techniques, material compositions, and load-bearing systems creates significant uncertainty when determining the feasibility of rooftop extensions. Despite often similar architectural appearances, these underlying structural dif-

ferences necessitate careful evaluation in each case, as the suitability for additional floors is contingent on the specific construction characteristics of the existing building.

Insufficient, inaccurate, and incorrect building documentation

This section addresses the availability and quality of building documentation. Although such documents are a technical prerequisite in planning processes, retrieving and evaluating them proved to be a substantial practical challenge. The accuracy and completeness of construction records are critical for assessing the feasibility of rooftop extensions. However, research into existing documentation for three- to four-storey housing settlements from the 1950s and 1960s in Hamburg revealed significant gaps and inconsistencies.

There have never been uniform national regulations regarding building permit applications and required building documentation in Germany. In Hamburg, the 8 June 1938 Building Inspection Ordinance (Baupolizeiverordnung [BPVO]) remained in effect long after World War II and was only replaced in 1969 with the Hamburg Building Code (Hamburgische Bauordnung [HBauO]) in 1969. In Schleswig-Holstein, the 1950 Legal and Regulatory Gazette specified which documents had to be submitted with a building application.[3] These included a construction description detailing building materials, a site plan, construction drawings at a scale of 1:100, and strength calculations to verify the load-bearing capacity of the construction. This final requirement was specific to structural elements made of steel and reinforced concrete, as well as to unusual or highly stressed timber joints and heavily loaded sections of masonry or foundations.[4] At that time, construction drawings were manually created as originals using drafting tools such as parallel rulers. Drawing instruments such as pencils, felt-tip pens, and ink pens were used for both drawing and annotating/dimensioning. If changes were made, the entire drawing had to be redone; minor alterations were, however, sometimes made by overlaying the affected area with transparent paper.

Researching the documentation of three- to four-storey housing developments from the 1950s and 1960s in Hamburg highlighted the fragmented avail-

3 Section 3, §15 Bauunterlagen, Gesetz- und Verordnungsblatt für Schleswig-Holstein 1950 Abschnitt 3 Bauantrag und Bauunterlagen.

4 Ibid., 232.

ability of such documentation. Given the absence of a centralized repository for construction documentation, an empirical investigation was conducted to assess the availability and quality of records across different sources.

Plan-related contingencies

One contingency stemming from planning issues is *incomplete building documentation*. During the research process, datasets of varying completeness were obtained. The objective was to gather construction drawings, strength calculations, and building descriptions for existing buildings. However, archive research yielded inconsistent results. Many of the documents originated from estates of Hamburg-based architects, and, in most cases, only site plans and construction drawings were available. The search, review, and digitization process (in this case, photographing documents on a light table) proved to be time-consuming. In contrast, research conducted directly with property owners, particularly housing cooperatives, was more fruitful. For the buildings from the 1950s and 1960s under investigation, construction drawings at a scale of 1:100 were generally available. These typically included floor plans of all storeys, longitudinal and cross-section plans, and elevations. Only two out of four cooperatives were also able to provide building descriptions.

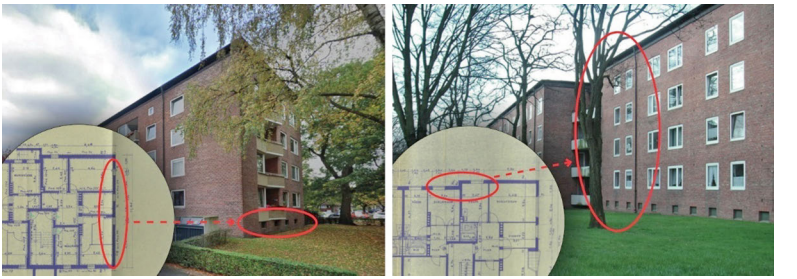
A major issue was the availability of strength calculations. Of the 83 datasets examined, only 20 contained strength calculations. Without these, it is impossible to make detailed statements about the load-bearing behavior of a building in the early planning phases in existing building projects. If property owners do not possess strength calculations and, as was the case in this research, such documents were removed from the archives of the responsible authorities decades ago, planners and decision-makers are left to make assumptions based on comparable projects and conduct costly on-site investigations. In the context of economic feasibility, contingencies regarding load-bearing capacity and material properties could lead to decisions in favour of demolition and new construction rather than retrofitting and rooftop extension.

A second contingency is based on *discrepancies in building documentation*. Research found that building plans in Hamburg often do not align with the actual constructed buildings. This applied not only to the original construction phase but also to subsequent modifications and renovations that are not recorded in the building documentation. Differences between original construction drawings and the final buildings frequently include design simplifications, material

reductions, or on-site improvisations. Commonly identified discrepancies involve variations in dimensions and façade configurations. In some cases, balconies and loggias were constructed differently than originally planned, and windows were positioned or sized differently.

One example is a multifamily building on Diedenhofer Straße. According to the available floor plans, the building was designed with a setback at the rear. However, this setback does not exist in the actual structure. Additionally, several window openings were identified on-site that are not reflected in the planning documents, including basement windows and an additional row of windows on the north side of the building. This was verified by comparing recent photographs, Google Street View images, digital orthophotos from Hamburg's State Office for Geoinformation and Surveying (Landesbetrieb Geoinformation und Vermessung), and an on-site visit (Figure 2). In this case, the simpler building geometry (without a setback) in the existing structure is advantageous for planning a rooftop extension and retrofitting. Discrepancies are particularly relevant for rooftop extension projects when they involve structural elements. However, such discrepancies should become evident early in the planning process through detailed on-site analysis and be taken into account accordingly.

Figure 2: Example of Diedenhofer Straße; discrepancies between planning documents and actual building.

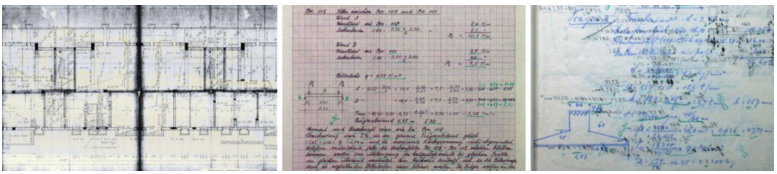


Source: Author. Illustration based on Google Street View imagery and documents from HANSA Baugenossenschaft eG.

Document-quality-related contingencies

The *reduced readability* of documents is a significant issue. Building drawings and strength calculations from the 1950s and 1960s were handwritten. Even when carefully stored in dry conditions, these documents show significant aging. This is evident in faded annotations and external damage that impairs readability. Strength calculations were often written on thin transparent paper, which becomes brittle with frequent handling. While building drawings were typically drawn and written in a readable handwriting style, sometimes using stencils for annotations, strength calculations were written in the individual handwriting of the structural engineer and supplemented with review notes (Figure 3). In contrast, building descriptions remain more easily readable today, as they were typed using typewriters.

Figure 3: Differences in the quality of building documentation; sample excerpts from a building drawing and strength calculations.



Source: HANSA Baugenossenschaft eG.

Also, many documents contain *ambiguous wording*. Strength calculations from the 1950s and 1960s contain outdated calculation methods and material designations. To compare existing calculations with current calculation standards, the units used at the time must be converted. For example, the units kg and kg/m² used in historical calculation are converted into kN and kN/m². Specifically, 100 kg corresponds to approximately 1 kN. Regarding a typical example of permissible soil pressure, 2.5 kg/cm² is equivalent to 250 kN/m².

Finally, the *degree of digitalization* must be considered. During the research on building documentation, documents with varying degrees of digitalization were found. Some plans existed in their original form, as large-format folded sheets that had suffered damage due to frequent use. A first step towards digitalization involved scanned versions of the original plans. However, working with these scans proved time-consuming, as the high resolution resulted in

large file sizes. Significant differences in quality were observed. Some plans had been graphically processed to maximize contrast, ensuring a white background and black annotations. A further step was the creation of 2D CAD drawings of the existing buildings. However, material specifications from the original plans were not included. No digital 3D models were available.

Extensive case-by-case assessments for rooftop extensions

The feasibility of rooftop extensions is fundamentally dependent on the structural condition of the existing building. However, due to the lack of comprehensive and reliable building documentation, assessing this condition often requires extensive case-by-case analyses. A complete set of documents forms an essential foundation for assessing whether the building's structure and materials fundamentally allow for an extension. However, it cannot replace thorough on-site analysis, which is essential to detect potential damage or structural deficiencies that documentation alone cannot reveal. In contrast to new construction, where a clearly defined planning framework exists, building in an existing context demands these intensive preliminary investigations to verify the residual capacity and structural stability of the building. These necessary individual assessments represent a significant contingency, as they introduce additional costs, time delays, and planning uncertainties that can impact decision-making processes regarding rooftop extensions versus demolition and new construction.

In addition to regulatory aspects such as setback distances, parking spaces, and escape routes, structural stability is a key factor in determining the feasibility of a rooftop extension. Based on the construction drawings and strength calculations, load-bearing elements can be identified and preliminary conclusions can be drawn regarding their remaining load-bearing capacity, for example, through past over-dimensioning or low utilization rates of individual components. It must also be ensured that the additional loads specified by current technical building regulations – such as dead loads, snow loads, and wind loads – can be safely absorbed and transferred by both the unmodified parts of the building and any additions.

The structural heterogeneity of multifamily buildings from the 1950s and 1960s further complicates these assessments. As established above, these buildings were constructed using a variety of materials and techniques, ranging from traditional masonry to prefabricated concrete elements. Given this

variability, a standardized evaluation process for rooftop extensions is hardly feasible, making the assessment process more demanding compared to new construction projects, where material properties and load-bearing capacities are clearly defined. The economic implications of these uncertainties play a crucial role in decision-making. In the past, an unfavourable cost-benefit ratio of full modernization compared to new construction has been a primary justification for demolition and new construction (Walberg and Gniechwitz, 2016: 50). The costs associated with extensive preliminary assessments often make rooftop extensions less attractive compared to demolition and new construction. In cases where load reserves are minimal or where significant structural reinforcements are required, the financial feasibility of an extension is often questioned.

Regarding the lifespan of buildings, a distinction is often made between technical and economic service life. The technical service life refers to the period in which a building component or layer fulfils its intended function, ending when its functionality is no longer guaranteed. These functions may include weather protection, structural stability, or fire safety. Construction materials used for foundations, walls, and ceilings generally have a long lifespan exceeding the reference period. Values for the expected service life of individual building components can be found in tables prepared by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR, 2017). The economic service life describes the period during which a building component remains cost-effective within the designated financial framework, whether with or without maintenance and repair measures. There is no universally binding lifespan, as different sources provide varying assumptions. According to the Real Estate Valuation Ordinance (Immobilienwertermittlungsverordnung) in its version dated 14 July 2021, the standard total useful life for multifamily buildings is 80 years.[5] Beyond these general model assumptions, the individual history of a building has a significant impact on the lifespan of its components and the overall structure, as well as on the possibility of extending the service life by at least 50 years through a rooftop extension project. While technical service life can extend beyond this period, the economic feasibility of extending a building's lifespan through an extension depends on cost-benefit considerations. If the required reinforcements and modifications exceed a certain threshold, the decision may favour demolition and reconstruction rather than an extension.

5 §12, Paragraph 5, Sentence 1, Annex 1.

From a structural perspective, precise knowledge of material properties is essential, as both structural and building physics aspects must be considered at the connection point between the existing structure and the rooftop extension (Fath et al., 2022). This requires ensuring compatibility between new and existing structures while maintaining essential building physics properties. To evaluate these aspects, planners must conduct detailed site investigations, structural assessments, and recalculations of existing load-bearing elements, even when original construction drawings and strength calculations are available, due to the potential for undocumented changes and material degradation over time. The decision between either retrofitting with a rooftop extension or demolishing is highly dependent on the quality of existing documentation and the condition of the building. Consequently, rooftop extension projects are often highly subject to planning risks.

New tools, persistent constraints: Assessing planning instruments for rooftop extensions

Several digital decision-support tools have entered the market, offering automated assessments of (re)development potential. In the context of building within existing structures, these tools primarily focus on energy efficiency measures and densification opportunities, including rooftop extensions. By automating building data analysis and incorporating regulatory constraints, they provide initial feasibility insights, reducing the need for time-intensive preliminary investigations. However, these tools also introduce new challenges and limitations, particularly regarding the accuracy of structural assessments when working with existing buildings.

For instance, CAALA GmbH produces software that systematically evaluates the retrofitting potential of existing buildings through automatically generated 3D models based on OpenStreetMap data and assumptions derived from the TABULA building typology[6] (for an overview, see Loga et al., 2011). Individual inputs regarding building envelopes, technical systems, and hot water demand allow for energy performance simulations, offering insights into possible efficiency improvements. While this tool provides valuable data on energy-related upgrades, it does not include detailed structural analy-

6 Typology Approach for Building Stock Energy Assessment.

sis or load-bearing assessments, which are critical for evaluating rooftop extensions.

Similarly, Syte GmbH employs AI-driven forecasts to assess potential forms of urban development, including rooftop extensions, repurposing, and densification. Its tool, an AI platform, relies on lidar data to evaluate possible development opportunities, integrating regulatory constraints such as Section 34 of the German Building Code (Baugesetzbuch),[7] which governs the permissibility of projects within existing urban areas. However, Syte does not assess structural reserves or load-bearing capacities, instead focusing on plot-level constraints and neighbouring developments.

While these tools offer valuable initial assessments, they highlight a fundamental trade-off between standardization and individualized structural analysis. Automated systems rely on generalized building typologies and assumptions, making them unsuitable for addressing the unique structural conditions of individual post-war buildings. As demonstrated in research on the material and structural variability of Hamburg's post-war housing stock, even buildings that appear visually similar can differ significantly in load-bearing systems, material composition, and prior modifications. Without knowledge of structural stability and load-bearing capacity, definitive statements about rooftop extension potential cannot be made.

Beyond technological limitations, another major challenge arises from the lack of economic incentives for working with existing buildings. Architectural and engineering services in Germany are typically regulated by the Fee Structure for Architects and Engineers (Honorarordnung für Architekten und Ingenieure, HOAI), which establishes compensation rates for planning tasks. However, the HOAI does not explicitly address the additional planning complexities associated with existing structures, nor does it define special services related to their assessment and retrofitting (Herke, 2019). This discrepancy leads to insufficient financial incentives for architects and engineers to prioritize work on existing buildings over new construction. The argument put forward by ARGE (Arbeitsgemeinschaft für zeitgemäßes Bauen), a working group for sustainable construction (Walberg and Gniechwitz, 2016: 50) further reinforces this point, stating that cost-benefit analyses have repeatedly favoured demolition due to the high costs of full modernization compared to new construction.

7 §34 Zulässigkeit von Vorhaben innerhalb der im Zusammenhang bebauten Ortsteile, Baugesetzbuch.

If modernization and extension are to be promoted as viable alternatives, financial incentives and compensation structures must both be reconsidered to reflect the additional effort required for working with the existing stock.

Unlike new construction projects, which follow a structured planning process from the macro to micro scale, working with existing buildings requires an adaptive approach (Herke, 2019). Early-stage planning must include detailed analysis of existing building components, which is facilitated by comprehensive building documentation. However, as demonstrated in the preceding sections, such documentation is often missing, incomplete, or outdated, requiring additional investigative efforts.

Given these challenges, architects thus play a crucial advisory role for property owners in determining the feasibility of rooftop extensions. From a climate policy perspective, all possible measures for reusing and upgrading existing structures should be considered before opting for demolition and new construction. The existing disincentives in regulation and compensation structures illustrate the need for frameworks that make sustainable building practices both financially and institutionally feasible.

Conclusion and outlook

This chapter has analysed why rooftop extensions on post-war multifamily buildings, despite their considerable ecological and spatial potential, often remain difficult to implement. Based on empirical research conducted in Hamburg, it has identified a set of interdependent conditions that affect the feasibility of such projects. These conditions can be grouped into two types: first, challenges that stem from the physical characteristics and documentation status of the building stock itself; and second, factors that relate to how planning actors deal with these contingencies in practice.

Among the first type are the structural and material heterogeneity of buildings from the 1950s and 1960s, and the fragmented and inconsistent nature of their documentation. These features are not simply technical details but form the material and informational starting point for any transformation strategy. The second type of conditions includes the necessity of conducting time- and resource-intensive structural assessments for each building and the limitations of current digital tools and regulatory frameworks. These aspects reflect how planners and decision-makers attempt to navigate the contingencies embedded in the existing building stock. Together, these interlocking condi-

tions highlight the complex realities of planning rooftop extensions. They show that transformation is not automatically enabled by ecological or strategic imperatives. Rather, it is conditioned by the specificities of the built past and by the systems through which planning knowledge is generated, interpreted, and acted upon.

While previous research has illuminated the participatory, social, and design-oriented dimensions of transforming post-war housing (Simon-Philipp and Hopfner, 2013; Harnack et al., 2020; Brunner et al., 2021; Kaufmann, 2024), this chapter adds a complementary perspective. It shifts the focus towards the technical and procedural conditions under which such transformations become feasible in practice, highlighting the role of documentation quality, structural constraints, and early-stage planning knowledge in shaping decision-making processes. The chapter thus provides a grounded contribution to ongoing debates about urban future-making. It illustrates that the reworking of the post-war building stock – one of the most widespread and typologically homogeneous forms of housing in Germany – offers substantial potential for climate-conscious densification. At the same time, it is accompanied by considerable contingencies that must be actively negotiated in each case.

Beyond this chapter, additional qualitative research currently underway is further exploring these dynamics by investigating how architects, structural engineers, and property holders deal with missing information, distribute responsibility, and make decisions between demolition, retrofitting, and rooftop extension. Preliminary findings confirm that the presence or absence of reliable documentation plays a decisive role in whether rooftop extensions are even considered. When documentation is available and comprehensive, planning processes are perceived as more manageable. When it is not, actors tend to defer such projects or reject them altogether.

Furthermore, the regulatory and financial framework has emerged as a central issue. As several interviewees have pointed out, the HOAI does not reflect the additional workload and uncertainty that comes with planning in existing structures. Compensation and remuneration for early-stage assessments, coordination between disciplines, and context-sensitive design work are insufficient. This structural imbalance discourages adaptive reuse and perpetuates a preference for demolition and new construction.

In sum, this chapter has argued that rooftop extensions, although widely discussed as a spatially efficient and ecologically promising intervention, are subject to a range of conditions that cannot be standardized or resolved in advance. Planning in the existing fabric is always situated, uncertain, and de-

pendent on institutional frameworks and professional practices. The contribution of this chapter lies in revealing these contingencies and showing how they shape the implementation of a transformation strategy that, in theory, could make a significant contribution to sustainable urban development.

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9. Green vs. concrete

The future of low-income mass housing amid climate-change uncertainties in India

Aboli Mangire

Introduction: The socio-ecological challenges of Indian housing missions

Low-income mass housing missions in India aim to eradicate slums and build new standardized dwelling units for the urban poor. Among India's most widely active missions over the last 20 years have been the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Slum Rehabilitation Housing (SRH), and Pradhan Mantri Awas Yojana-Urban (PMAY-U) programmes. Founded on the 'slum-free cities' vision, these missions have been delivering structurally improved dwelling units in Indian cities. The JNNURM is recognized as the mission that initially delivered a number of slum improvement projects, but these eventually dwindled in number. Under the SRH programme, despite having been provided new dwelling units in cities such as Mumbai, inhabitants tended to reject the SRH housing estates and retreat to slums. The most recent of the missions, the PMAY-U, is learning from its predecessors while moving ahead with the vision of *housing for all by 2022* (MoHUPA, 2015). Even though it did not meet its goal of building 20 million homes by 2022, the PMAY-U mission has delivered housing with unprecedented speed: Between 2015 and 2023, 7.5 million homes were supplied to the urban poor of India. Yet, a number of social challenges still persist. Researchers worldwide have criticized mass housing projects for acting as planned environments that reproduce or reshape poverty; they are thus sceptical of the resettlement of slum dwellers into such estates (Doshi, 2013; Bhan, 2017). I refer to this debate to gain a critical perspective on the Indian housing ministry's vision, which can be interpreted as poverty-alleviating but may not

truly be so. Therefore, I argue that the actual policy manifestations must be questioned and disentangled from the evidence available for public use.

What is more, Indian policy makers and inhabitants have been faced, during the same time frame, with the intensifying phenomenon of rising temperatures and heatwaves. India is a country largely dominated by areas with a high cooling demand. Above 96% of its population and new construction are located in the four climatic zones that typically require space cooling.[1] The challenge of climate change is becoming strongly visible in the steady rise of space cooling demand due to factors such as a growing population in a tropical climate as well as rising aspirational needs fuelled by sustained economic growth.[2] Added to this, an exacerbating backdrop is provided by the urban heat island phenomenon, that is, increased urban temperatures resulting from a number of key causes, including the density of cities, an increase in hard and heat-absorbing surfaces, and a reduction in natural vegetation (Mohajerani et al., 2017). Heatwaves, urban heat islands, and a high demand for space cooling represent a worsening ecological balance in the face of urbanization and climate change. Low-income populations in this scenario are especially vulnerable and will be faced with additional unforeseeable cooling costs. Thus, Indian mass housing missions, although they are rapidly catering to the slum-free cities vision, face socio-ecological challenges that impede long-term sustainability.

Owing to specific features of the Indian metropolis – its speed of urbanization, limited land for construction, and housing missions such as PMAY-U – the low-income building typology can be seen as changing over the last decade from low-rise slums, chawls, and group housing to denser mid-rise apartment blocks. Climate-induced challenges have drawn attention to creating affordable and energy-efficient architecture for mass housing, specifically through passive cooling design[3] and green spaces. Historically, architects in the Indian subcontinent have relied on diverse building elements and techniques for

1 *Energy Conservation Building Code for Residential Buildings* (BEE, 2018). This building code document is published by the Bureau of Energy Efficiency (BEE), within the Ministry of Power.

2 *India Cooling Action Plan: Operationalizing Space Cooling Recommendations*. This 2019 policy document, published by the Ministry of Environment, Forest and Climate Change (MEFCC, 2019), aims to create a macro-level policy tool to manage India's growth in the need for space cooling.

3 Passive cooling design is a branch of passive solar design defined as low-energy and low-cost, with techniques to reduce dependency on mechanical ventilation, used to prevent or modulate heat gains and to improve thermal comfort. It is characterized

transferring heat and preventing overheating (Kamal, 2012). The typology change has retained a few traditional overheating prevention techniques, including solar shading, cantilevers, and light shafts. On the other hand, heat-transfer techniques such as courtyards, open green spaces, and shade trees are notably reduced in number in the new typology. Researchers have argued that these ecologically conscious heat-transfer techniques positively catered to the social and cultural needs of inhabitants (Kamal, 2012; Gupta and Joshi, 2021). Some of these arguments refer to examples such as courtyards being used as kitchen facilities and for recreation, open green spaces hosting multigenerational leisure activities, and tree platforms signifying a communal assembly point. Careful attention to these dynamics is thus necessary to ensure that the social, cultural, and ecological impact of diminishing courtyards, open green spaces, and large shade trees is adequately taken into consideration to suit the new typology as well as inhabitants' daily lives.

Even though Indian housing missions advocate for integrating passive cooling design in low-income mass housing buildings, there are hurdles along the way toward implementation. The problem is not merely architectural or of urban design, but rather one that entails an entanglement of the housing missions' visions, inhabitants' responses to the actual built outcomes, and the increasing energy demands triggering indeterminable effects. The problematization thus involves two levels. First, there is the uncertainty emerging from a mismatch between a housing mission's vision and inhabitants' acceptance of the newly built housing. Second, the newly built housing must meet newer and future climate necessities for which the existing measures will not be adequate. To address this problem of implementing passive cooling design, I draw on methodological elements from environment-behaviour studies (E-B studies) to conduct qualitative spatial research (Creswell, 2007). In particular, I examine the practices and tools used by built environment professionals as a contingency to cope with current as well as potential future challenges. This includes providing formal housing that not only resists the growth of slums (current challenge) but also meets the demand for space cooling (future challenge), and how the in-between mismatch is dealt with or not dealt with. The socio-spatial approach of environment-behaviour theories allows for a critical analysis of data drawn from social and spatial disciplines on three

by saving energy and associated costs and hence improving building energy efficiency (Asimakopoulos and Santamouris, 2013).

timescales: the vision and plans in the past, material form and its acceptance in the present, and the vision and planning for the future.

The mass housing case study selected for this research is located in the Pune metropolitan region in India. Pune is the ninth largest city by population in the country and second largest (Mumbai is first) in the federal state of Maharashtra. Once known as a *green haven*, the city has witnessed a phenomenal rise in its population due to expanding IT hubs, industrial growth, and nationally renowned universities and other educational institutions. Urban expansion has led to deforestation, loss of green cover (Kantakumar et al., 2016), and rising levels of air pollution. I carried out qualitative spatial research in the years 2023 and 2024 on housing buildings constructed in the year 2010. This case study's contribution is intended to provide empirical evidence of opportunities and barriers in the daily lives of inhabitants, as studied closely in relation to the form and materiality of housing. A further intention is to contribute to the growing knowledge base on the integration of passive cooling designs in standardized housing blocks. It is important to note that in this research the resettlement aspect of low-income housing, although a crucial aspect, is not under investigation. Therefore, the resulting effects of resettlement, such as community-loss, displacement, or loss of employment (Marcuse,1985; Cernea, 1995; Slater, 2009) are deliberately left out of the scope of this research. On the other hand, this research aligns itself within a debate in urban design that primarily argues that the densification of mass housing forms has had a negative impact on liveability, reducing inhabitants' mental, physical, and social well-being (Newman, 1973; Coleman, 1985; Evans et al., 2000; Dempsey et al., 2011; Jana et al., 2022).

The structure of this chapter is laid out as follows. The next section begins by detailing the policy, built-environment, and social contexts of Indian metropolitan cities. The subsequent section highlights the current state of research in environment-behaviour studies (E-B studies), and post-occupancy evaluation (POE) research then details specific research gaps. The fourth section presents the case study and research methods. Findings in the subsequent section are structured into three dimensions, namely, technical, functional, and behavioural. The final section discusses the lessons from this case to inform the broader discussion of contingencies in urban future-making, before a brief concluding section.

Low-income mass housing and climate-change challenges: The Indian context

India's Ministry of Housing and Urban Poverty Alleviation (MoHUPA), hereafter referred to as the Indian housing ministry, or housing ministry, initiated low-income mass housing programmes through a central funding support structure. The leading national objectives include fulfilling the dream of every person to own their own home, as well as completing the massive construction of dwelling units by 2022. For the current housing mission, PMAY-U, the housing ministry is approaching these objectives with three strategies – listing best practices with model projects, standardization of construction, and planning norms (MoHUPA, n.d.). The first of the three strategies that guide the PMAY-U mission is set out in a housing ministry compendium titled *Best Practices: Habitat Planning and Design for the Urban Poor*. It contains a list of 15 model projects from previous housing missions (JNNURM, RAY, BSUP). Out of a total of 15 listed model projects, 9 are related to the relocation and complete transformation of slums into mass housing, while 6 projects are about the in-situ improvement of original housing on its original land. In this compendium, the housing ministry uses the term *slum* abundantly in relation to key words and phrases such as *rehabilitation, low standard of living, clearing off slums, slum-free city, relocation to private land, and key role of private sector* (MoHUPA, n.d.). The *Best Practices* compendium serves as published evidence of how the housing ministry envisions the PMAY-U mission as a radical shift from incremental, low-scale, in-situ slum improvement projects towards clearing the slums, relocating residents, and constructing new mass housing on new land.

A second strategy, the standardization of construction, has been adopted by the housing ministry's Building Materials and Technology Promotion Council (BMTPC). In 2018, the BMTPC published a book titled *Compendium of Prospective Emerging Technologies for Mass Housing*. This book's 'Background' section notes that

> traditional building materials e.g. brick, cement, steel, aggregates, sand etc. […] are either based on natural resources which are finite in nature or energy intensive or emit greenhouse gases during production. Thus, the entire proposition of using these materials as usual will not be sustainable and environment friendly. Further, the construction technologies being practiced in

> India is cast-in-situ RCC beam-column construction[4] which is primarily slow track methodology and is subjected to time and cost overruns. Also, these constructions are labour intensive, which further hamper fast delivery, as there is acute paucity of unskilled labour force in cities. Therefore, it is prudent to take a paradigm shift from brick and stick approach. (BMTPC, 2018: 1)

Emerging reinforced cement concrete (RCC) technologies that have been successful globally in the last 10 years are demonstrated in the pilot housing projects. Some pilot projects are listed in the model projects. Both the BMTPC's book and the pilot projects advocate RCC construction types, such as the monolithic concrete system, precast concrete panels, and fast-track modular systems, among others. Bricks made of natural building materials (clay, stone) have been traditionally used in building envelopes due to their cooling effects in indoor spaces but are now diminishing in new construction practices (Vijayan et al., 2021). What is concerning is that the main focus of the BMTPC book and pilot projects – which keep cost, time, labour, and natural materials *low* for *low-income mass housing* – does not include thermal evaluation of building envelope materials. The shift from traditionally used natural materials (clay, sand, stone) towards concrete-heavy systems involves a significant change in the thermal performance of buildings, which directly affects the energy demand for space cooling.

A third strategy concerns the building codes: A key climate change policy tool, published a year after the BMTPC book, can be observed as the national ministries' next systematic step towards the standardization of mass housing buildings. It is titled *India Cooling Action Plan (ICAP): Operationalizing Space Cooling Recommendations* and was published in 2019 by the Ministry of Environment, Forest and Climate Change. Emerging from the *ICAP*, new building codes have been rolled out by the Bureau of Energy Efficiency (BEE). BEE's building code, the *Energy Conservation Building Code for Residential Buildings* (BEE, 2018) provides recommendations for achieving energy-efficient building envelopes in concrete construction. At present, recommendations to improve the thermal performance of concrete buildings are not included in this code. In future, new

4 Reinforced cement concrete (RC) frames consist of horizontal elements (beams) and vertical elements (columns) connected by rigid joints. Beams and columns are cast in a single operation in order to act in unison. See Ahmet Yakut, 'Reinforced Concrete Frame Construction', *World Housing Encyclopaedia*, EERI and IAEE, https://www.world-housing.net/wp-content/uploads/2011/06/RC-Frame_Yakut.pdf.

parts are planned to be added. Such steps suggest the acceptance, or even welcoming, of the shift from natural materials to concrete. But it does not ensure the climate adaptability of the PMAY-U mission's massive mass housing stock.

In sum, the three strategies raise critical questions that are currently not accounted for by the Indian housing ministry: How many dwelling units have been built without meeting the new thermal code? And how many households will be exposed to the uncertain risk of concrete's weak thermal performance? In absence of using traditional building materials with cooling properties, it is more essential than ever to carefully find ways to improve the cooling effect of concrete buildings and their immediate surroundings. Due to the increase in hard and heat-absorbing surfaces such as concrete, improving passive cooling in buildings is necessary to moderate not only the space cooling demand but also the urban heat island effect on the neighbourhood. I argue the new construction shift runs the risk of being inadequate for future climate necessities. However, in order to address such questions, more knowledge is necessary about the ways in which planning and construction are actually implemented, and about the ways in which households deal with the thermal qualities of new concrete buildings on a daily basis. The next section gives an overview of the approaches to socio-spatial investigation of architecture that address the above argument.

Socio-spatial investigations in post-occupancy evaluation: Current state of research

Since the early 21st century, socio-spatial investigation has emerged as a key strand of built-environment research. Based on the theoretical lens of environment-behaviour research,[5] it aims to capture the perspectives of end users with respect to social investigatory aspects, as well as the perspectives of building professionals in regard to spatial investigatory aspects. There is a wide range of environment-behaviour-based evaluation methods for assessing occupied buildings, including the PROBE methodology (Cohen et al., 2001), the

5 Environment-behaviour (E-B) research is a multi-disciplinary field that advocates a greater involvement of users and a more detailed consideration of user aspects in the design process. E-B research has knowledge overlaps with other approaches and terms such as 'environmental psychology', 'human-environment studies', 'human factors', 'behavioural architecture', and 'social ecology' (Kar and Sarkar, 2017).

Design Quality Indicator (Gann et al., 2010), the Achieving Excellence Design Evaluation Toolkit (Ruddock and Aouad, 2009), post-occupancy evaluation (Preiser et al., [1988] 2015; Williams et al., 2016; Hay et al., 2017), and socio-physical liveability (Sarkar and Bardhan, 2020). These examples illustrate how assessment surveys can be integrated into case-study-specific research questions. David Michael Gann, Ammon J. Salter, and Jennifer Whyte (2010) argue that there is a widespread gap in 'measuring design value' within the building design and construction industry. They emphasize that this is due to the varying nature of building attributes. These attributes are physical, such as light levels as measured in lux, but also perceptual, such as a feeling of warmth or comfort, which is subjective to every building user. This highlighted gap underlies the above-mentioned socio-spatial evaluation examples, and these examples explore methods of understanding the value of a building in relation to its design, and to the range of physical, emotional, and aspirational needs of its occupants. Such environment-behaviour-based evaluation methods are considered an important contribution to built-environment methodologies rather than a definitive technical solution.

The post-occupancy evaluation (POE) method has emerged as a key approach within the broader field of environment-behaviour research. Social scientists, designers, and planners use it to understand the experience of building users (Zimring, 2013). There are three identified types of POE – indicative, investigative, and diagnostic (Preiser et al., [1988] 2015, quoted in Cooper et al., 1991). The indicative type attempts to identify major functional failures and successes of a building in a general manner and is conducted by one person. The investigative type aims to allow more detailed monitoring of building performance. The diagnostic type attempts to find results that can be generalized to a series of buildings, and it employs a team of researchers. The indicative type of POE allows for quick, simple, small-scale investigations which can provide feedback on buildings' physical qualities that foster or impede the desired or necessary behaviours of building residents (Cooper et al., 1991). Not only does it allow data collection on multiple dimensions, but it also gives flexibility to adapt the survey questions as per the needs of an investigation and the studied case.

Even though earlier usage of POEs was seen as successful in the context of public buildings, offices, and care homes, and later seen useful in energy efficiency certification, usage of POEs in the context of architecture practice and particularly in the mass-housing context is rather limited. In the United Kingdom, use of POEs in building standards and certification has been estab-

lished and includes POE integration into the building standard and procurement process (Hay et al., 2017), POE guidelines in the Royal Institute of British Architects (RIBA) handbook (Williams et al., 2016), and POE incorporated into green building certification in international building energy efficiency standards such as those from LEED, Passivhaus, and the Green Building Council. However, as Rowena Hay, Flora Samuel, Kelly J. Watson, and Simon Bradbury (2017) argue regarding the limited utilization of POE in architecture practice, 'there is little evidence that this body of research has transferred to the practice environment to close learning loops and ensure future projects are informed by a joined-up evidence base rather than the isolated experience of individual professionals' (Hay et al., 2017: 699). The authors further emphasize the role of architects in advancing POE to become a widespread and consistently embedded aspect of standard practice in the construction industry.

Summarizing the current state of research, an ambivalent picture can be painted: On the one hand, socio-spatial investigation with POE offers a wide range of design assessment opportunities. Yet on the other hand, uptake and transference of POE-generated data is limited in the architecture discipline. POE's use is established in cases of social housing in the United Kingdom, but it is especially limited as a tool in the context of low-income mass housing in India. The swift and small-scale indicative POEs (Cooper et al., 1991) could potentially be of high value in the rapidly materializing Indian social housing sector to quickly and systematically collect input. To complement the ministry's efforts, it is necessary to implement methodological interventions and critical lessons learned from model projects. For example, POE-based investigations can fill a related research gap in studies in order to systematically assess changing housing typologies and identify the evolution or integration of passive cooling design techniques. Such methodological interventions can take place with the active participation of local architects, engineers, and community-based actors. For this research, I used an indicative type of post-occupancy evaluation (POE) to investigate the case study in order to identify physical qualities of mass housing buildings that foster or impede desired behaviours of building residents. The case study and research methods are outlined in the next section.

Case study and research methods

Located in 15 cities in 8 federal states, model housing projects in India vary from each other in density, size, design layout, building materials, and infrastructure. Mass housing projects range from 300 dwelling units in two-storey buildings (in-situ slum upgrading), to 1,650 dwelling units in four-storey buildings (slum relocation), to the largest project, containing 13,700 dwelling units in four-storey buildings (rehabilitation of flood victims). The design layouts and building arrangements of model projects contain various spatial elements and techniques, including medium to large public spaces, cluster layouts, courtyards within building clusters, and medium-rise buildings separated by adequately wide internal alleys (Jana et al., 2022). These spatial elements positively influence air ventilation, social interaction, community relationships, visual cognitive interaction, improved cycling opportunities, and walkability (ibid.).

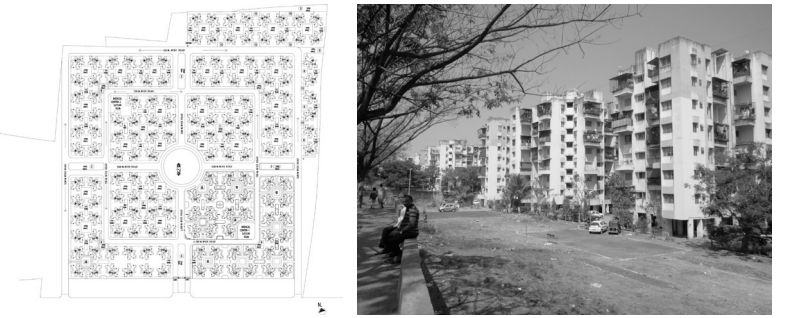
I have selected the Gharkul housing complex, one of the 15 PMAY-U model projects, as an empirical case study on which I construct a narrative of *imagined outcome* and *actual outcome*. The Gharkul project is the densest among all the 15 model projects, featuring apartment buildings with the most storeys (Figure 1, right). It is listed as a model project for its efficient apartment design, cluster layout, adequate social infrastructure, and innovative, rapid construction technology (MoHUPA, n.d.). It is also a pilot project for a concrete-based construction technology used for the first time in an Indian public project (BMTPC, 2018). With the highest concrete density among PMAY-U model projects yet predicted to meet good planning standards for natural ventilation (ibid.), the Gharkul project holds key answers to concerns of whether the shift from natural materials to concrete is workable or not.

The project timeline – from the sanctioning of funds, to constructing infrastructure and buildings, to finally handing over apartments to inhabitants – spanned the years 2007 to 2022. Its site plan (Figure 1, left) contains 160 buildings in total, each featuring 7 storeys which rise above ground-level parking. Each apartment building is inhabited by 42 households, thus a total of 6,720 households live in the housing estate. Its 160 buildings are arranged in 40 clusters, which are each centred around a courtyard. The construction technology used in the Gharkul project, a monolithic concrete construction system using aluminium formwork, is described in the book *Compendium of Prospective Emerging Technologies for Mass Housing*, where it is categorized as '[s]uitable for

low rise to high rise structures' (BMTPC, 2018: 10). The text then describes that the system is

> in place of traditional RCC framed construction of columns and beams and infill walls' and that 'all floors, slabs, columns, beams, walls, stairs, together with door and window openings are cast-in-place monolithically using [an] appropriate grade of concrete in one operation. The custom-designed modular formwork made up of Aluminium/Plastic/Aluminium-Plastic Composite is used for the purpose which facilitates easy handling with minimum labour and without use of any equipment (ibid.).[6]

Figure 1: Site plan of the Gharkul project (left); street view of mass housing buildings (right).



Source: Pimpri Chinchwad Municipal Corporation (PCMC) (site plan, left); Author (photograph, right).

This research employs a two-pronged qualitative research approach: an examination of national-level housing and cooling policies, and an empirical case study of the Gharkul project. Document research of housing and cooling policies informed the analysis of the housing ministry's aims and objectives. Qualitative spatial research of the Gharkul project was used to analyse the imagined outcome from the perspective of the project architects and engineers, based in Pune. The Gharkul case study allows an informed understanding of the actual qualities of the spaces as experienced by their inhabitants. Spatial research based on post-occupancy evaluation (POE) is

6 Language errors appear here as in the original source.

guided by and analysed through *technical*, *functional*, and *behavioural* dimensions (Preiser et al., [1988] 2015, quoted in Cooper et al., 1991). The technical dimension refers to the building design, construction, and cooling techniques; data for this dimension is drawn from interviews with the professionals involved in constructing and managing the Gharkul project. The functional dimension focuses on the spatial functions of the green and open spaces within the apartments and the wider community space; here, data is drawn from architectural drawings and field observations. The behavioural dimension examines the actions of the inhabitants in relation to using the space in a specific way; data on this is derived from interviews with inhabitants and a focus group discussion.

Spaces to be analysed for their functional dimension were identified based on a literature review of passive cooling design and field observations of the case study. Appropriate spaces having a dual quality of passive cooling benefits and greening potential were identified. Floor plans were the primary type of architectural drawing used to analyse spatial distribution and spatial measurements. My former professional experience as a practicing architect in the city of Pune was beneficial in understanding the data in these drawings. Nine in-depth semi-structured interviews of inhabitants were carried out in person by me. After the first round of in-depth interviews, an in-person focus group discussion, with 15 participants, was arranged to uncover information through open-ended questions. In addition, field observations were collected in the form of photographs, field notes, and short impromptu conversations with on-site and available persons. The primary analysis method is a qualitative content analysis, namely, reflexive thematic analysis (RTA), employing manual coding across datasets (Braun and Clarke, 2019). In this, iterative and non-linear phases of analysis, such as data familiarization, initial coding, theme generation, potential themes review, and theme defining, are followed (Byrne, 2021).

Imagined versus actual outcomes of standardized mass housing design: Key research findings

Arnab Jana, Ahana Sarkar, and Ronita Bardhan (2022), in their study performed using computational fluid dynamics (CFD),[7] predict the thermal performance of a number of PMAY-U model projects. These researchers view the built-volume techniques in the Gharkul project as representing good standards of housing planning. Cluster layouts with inner courtyards and, in particular, individual balconies, improve ventilation effectiveness, a major metric in reducing transmission of airborne diseases such as SARS and Covid-19 (Jana et al., 2022). In my empirical study of Gharkul, air ventilation and thermal comfort were noted by inhabitants as 'satisfactory', with one minor follow-up suggestion of faulty windowpanes that need maintenance; in total, evidence indicates a positive perception on these fronts. This correlates with the study by Jana, Sarkar, and Bardhan (2022), which provides computational evidence of how the passive cooling heat-transfer techniques designed in Gharkul's building volume can improve natural ventilation. With this data, I emphasize that Gharkul serves as a solid example of effective planning standards in reducing energy demand for space cooling. However, I further argue that the choice of concrete as a construction material poses serious future threats. To illustrate this, in the following sections, I lay out my research findings, structured in three dimensions: (1) technical – construction and cooling techniques, (2) functional – spatial functions of heat-transfer techniques in inhabitants' lives, and (3) behavioural – inhabitants' typical greening actions in using space.

Technical dimension: Construction and cooling techniques

The standardization of low-income mass housing is a key strategy that works effectively for the Indian housing ministry, the environment ministry, and the Building Materials Technology and Promotion Council (BMTPC) to pursue their goals. It enables the rapid construction of multiple apartment units;

7 Computational fluid dynamics (CFD) is the use of computers and numerical methods to solve problems involving fluid flow. Its applications in civil engineering extend to topics such as wind loading, structure vibration, wind and wave energy, ventilation, fire, and others. See David Apsley, 'Introduction to CFD', *The University of Manchester*, https://personalpages.manchester.ac.uk/staff/david.d.apsley/lectures/comphydr/introcfd.pdf.

a reduced energy demand for space cooling; and a technological shift that minimizes time, cost, labour, and natural materials – thus addressing the respective priorities of these three entities. At the case-study level, municipal goals, along with these national goals, provide other useful insights. As per the remarks of the interviewed municipal officer, physical infrastructure, such as water supply, sewage treatment, roads, storm water drainage, street lighting, and other electrification, as well as social infrastructure, such as a health care facility, a vegetable and convenience market, and a community centre, are the significant achievements of the Gharkul project. The officer believes that such infrastructure is essential but may have not been available in the previous living arrangements of many Gharkul households.[8] Another achievement, as viewed from the perspective of the structural engineer involved in the project, is having a uniform quality control of a large number of apartments, i.e. 6,000 units – an outcome that was not possible earlier, with traditional construction methods.[9] In the Gharkul housing project, however, as per the structural engineer, the use of a monolithic concrete construction system using aluminium formwork offered the desired quality control of construction as well as effective earthquake resistance.

In the energy efficiency building code document published by the Bureau of Energy Efficiency in 2018, two architectural solutions are provided to address cooling. The first is a set of simple-to-use thermal comfort calculation tools for new buildings.[10] The second is the use of passive cooling design techniques in new construction. The Gharkul project was constructed before 2018, before that building code was published. Yet empirical fieldwork conducted during this research reveals that the Gharkul architects did, nonetheless, consciously design spatial elements that maintain satisfactory levels of air ventilation. Heat-transfer passive cooling techniques identified in the Gharkul project include (1) a cantilevered balcony for each apartment, (2) open but sheltered ground-level areas for inhabitants' common use, in the style of Singaporean *void decks*, and (3) community courtyards in every four-building cluster. According to interviews with inhabitants, the aforementioned techniques have had positive functions in their daily lives. On the other hand, in mass housing projects newer than Gharkul but in the same

8 Structured interview with the municipal officer in charge of supervising the Gharkul housing project.

9 Structured interview with the structural engineer of the Gharkul housing project.

10 *Energy Conservation Building Code for Residential Buildings* (BEE, 2018).

PCMC region, housing density has increased. This has been achieved by an increase in the number of building storeys from 7 (in Gharkul) to 14 (in newer PMAY-U projects). However, the open spaces in housing estates and neighbourhood parks have not increased twofold, as the housing density has. This finding highlights that changes in the building code alone are insufficient in addressing the decrease in passive cooling spaces.

Figure 2: Concept drawing of a typical building cluster in the Gharkul project (left); courtyard in a building cluster (right).

Source: MoHUPA (n.d.) (concept drawing, left); Author (photograph, right).

Functional dimension: Spatial use of heat-transfer techniques in inhabitants' lives

In Figure 2, two phases of the Gharkul project's architectural process can be seen. Even though there are more drawings and processes in-between, these two depictions serve as a good representative example for the process of producing social housing in India. The first phase (Figure 2, left), depicted in a concept drawing, shows a cluster layout of four identical buildings set around an inner green courtyard. The central green square represents the inner courtyard surrounded by a paved concrete walkway. This captures the initial design vision before the construction process. Finally, the last phase (Figure 2, right), evidenced in a photograph, shows the cluster courtyard documented during fieldwork for this research in 2023. The inner courtyard envisioned in the con-

cept drawing as an open green space is not green in the actual outcome. This is a major issue that is not represented in the drawings but revealed in the research findings. The inner courtyard instead contains water storage tanks and the underground building foundation, seen as raised concrete platforms (Figure 2, right). Due to these underground structures, some forms of vegetation are not possible. Major restrictions are imposed by the management authorities for greening and planting trees due to the serious risk of damage to the underground concrete structures by means of tree roots and potential water leakage,[11] even though inhabitants are inclined to greening these spaces. Consequently, the envisioned *green* spaces are ironically manifested as *grey* concrete surfaces.

A second issue that is not represented in the architectural process (Figure 2) but discovered in the fieldwork concerns the limits to barrier-free access to community space. As per fieldwork observations, interviews with inhabitants, and a focus group discussion, community space on the ground floor is the most multifunctional community interaction area in each individual building. Community members of varying age groups, genders, and social subgroups, individually or in groups, use parts of the spaces for formal and informal community gathering, playing, resting, and exchanging short conversations. The design problem is the limited elevator access. Existing elevators only serve alternate floors instead of serving all of the seven floors of the building. Even though it is not a common practice, this was done as a cost-cutting measure.[12] The implication of this design leaves half the building inhabitants with no barrier-free access to their own apartments. The inhabitants living on floors without direct elevator service have to use stairs to go down to a lower floor and then access elevator service. In addition to that, limited elevator access hinders less physically abled inhabitants, elderly people, and pregnant women living on floors without direct elevator service from traveling down to the ground-level community space as frequently as they would like. No barrier-free access is a serious burden in the daily lives of some inhabitants. Thus, the functional dimension of the research findings has revealed serious structural limitations to the future of greening and inclusive community life in the Gharkul project, which can have adverse impact on long-term residential liveability, community interaction, and sense of belonging.

11 Information recorded in surveys with inhabitants and during the discussion with a site engineer.

12 Information recorded in the discussion with a site engineer.

Behavioural dimension: Inhabitants' greening innovations in the concrete building envelope

Study of the lived experience of the Gharkul housing project was insightful in revealing the link between the lack of open green spaces and inhabitants' greening innovations. Dedicated open spaces in the Gharkul site are observed to be left unmaintained by the municipality and unused by inhabitants. However, the greening culture observed is noteworthy because it is particularly integrated into the concrete building envelope or surface. Figure 3 is a compilation of such greening examples integrated both into the concrete building envelopes and into inhabitants' daily lives.

Figure 3: Greening practices observed in building on street level (left); shaded street space (middle); use of balcony (right); Gharkul project, March 2023.

Source: Author.

In Figure 3 (left), despite the structural limitations of paved and concrete surfaces, a series of potted plants is used by inhabitants to create a green wall. This green wall serves as a design element that grants privacy from the adjoining street. It also provides vegetation cover, which is beneficial for its cooling effect. Animals such as birds and stray dogs have been observed sitting around such green areas for refuge during hot afternoons. Figure 3 (middle) shows a shopkeeper – who is also one of the interviewed inhabitants – set his makeshift tobacco shop in the roadside shelter provided by a medium-sized shade tree. Cool, shaded space in a hot afternoon is observed to be a space of exchanging short conversation between the shopkeeper and a mobile fruit seller. An action – of taking a break – suggests a behavioural dimension, which is influenced by the green and cool environment. This behavioural dimension is observed not only in humans but also in animals.

As another example, all of the interviewed inhabitants typically use their balconies as a private space (Figure 3, right). Spatial use includes storage, sewing, drying, and kitchen-related activities, as well as planting herbs and medicinal plants. The current design of the balconies offers inadequate solar shading, hence making the outdoor areas very hot. Almost all of the households have covered their balconies with inexpensive metal roofing, while some have covered one side with a green fabric wall. Some have used balconies for growing potted plants, turning them into private gardens that are also a shelter from harsh weather. There is a positive potential for introducing more of such cantilevered spaces in future designs due to their multiple benefits. Some of the most beneficial functions assessed also save ground space for other needed activities such as social gatherings, vehicle parking, and the planting of larger trees. Greening provides a private, cool haven in a scenario of ever-less inter-building space. Thus, inhabitants integrating greening within the concrete building envelope, the building surfaces, and their daily lives use it to gain essential aspects such as cooling, privacy, gardens, and hobby spaces. Greening also acts as a counterforce against a hot climate for inhabitants and animals alike.

Contingencies in the adaptation and greening of mass housing in the face of climate change

Turning to a discussion of the contingencies that emerge in Indian mass housing, I will structure this section around the two elements of contingency mentioned earlier: (1) the uncertainty emerging from a mismatch between the vision of the housing mission and the acceptance of the inhabitants, and (2) the possible inadequacy of newly built housing to further meet future climate necessities, for which existing measures will not be sufficient. From the case study of the Gharkul project, standardized monolithic RCC construction emerged as a low-income mass housing solution, arising from the national strategies of model projects and construction standardization. When understood in light of the historical background of these strategies, it can be seen that the central future threat that the Indian housing ministry has been addressing is the *reappearance of slums*. Globally and in India, slums have been defined by organizations, researchers, and ministries in various ways; however, one important aspect of slums that is invariably defined and observed is the *temporary* nature of their material condition. On the one hand,

the structural system used in the Gharkul project drastically constrains any future adaptation in walls, ceilings, or foundations. Any small adaptation to these, if made, may damage the entire building's stability,[13] hence such modifications are prohibited and strictly monitored. The housing ministry, to avoid the reappearance of temporary slums in the cities, has constructed permanent housing units. However, as seen in the Gharkul case study, this *permanency* is manifested as *inflexibility*, and is a serious threat to the future adaptation of these buildings.

On the other hand, permanency can also provoke *flexibility,* seen in terms of the inhabitants' greening and shading innovations set within the inflexible concrete envelope and surfaces. This is evident in how inhabitants' shading efforts are seen on a majority of the 6,720 concrete balconies, implemented by using metal roofing or sometimes green fabric walls for additional lateral shading. In addition, flexibility can be viewed in terms of how inhabitants use and adapt the community space – the open ground-level community space and adjoining courtyards. It can be witnessed in how they are trying to grow small- and medium-sized trees in the periphery around concreted courtyards, to the degree tolerated by the strict municipality codes that control the planting of large shade trees. And it is seen in how they erect makeshift fabric roofs as a shading element above the same community and courtyard spaces during festival gatherings, children's birthday parties, and public holiday celebrations. This emphasizes that the balconies and courtyards of the Gharkul project – the heat-transfer techniques employed by the building architects much before the cooling action plan – allow inhabitants to be flexible within the inflexible concrete building envelope. Thus, in the new contingencies around cooling strategies, the existing best practices already employed by architects across many different Indian cities, which have become successfully adapted by inhabitants and integrated into their daily lives, should be effectively studied and supported.

In sum, one of the most pronounced challenges of standardized mass housing stock is adapting the housing form to the needs of the inhabitants, given the changing needs concerning the built environment of mass housing in India. Although existing policy tools and building codes provide technical solutions to address problems with new construction, they fall short of addressing the adaptation needs of existing housing stock. This raises a critical

13 Structured interview with the structural engineer of the Gharkul housing project.

question of structural inadaptability and inflexibility, which can lead to unavoidable building decay and, further, to an inevitable demolition instead of adaptation. In such a context, focusing on behavioural dimensions to building adaptability is essential. In addition, non-envelope or built-volume-related heat-transfer techniques (such as courtyards and open green spaces) are needed to be integrated into the new cooling action plan's code. In such a way, the newly built housing will not only be equipped with the existing successful measures but also be enhanced with the new cooling strategies to meet the future climate necessities.

Conclusion

Informed by the debate around whether mass housing projects may act as planned environments that reproduce or reshape impoverishment practices (Doshi, 2013), the overarching aim of this chapter was to gain a critical perspective on the Indian housing ministry's low-income mass housing. I selected one of the ministry's 15 model projects as a case study to locate the discrepancies between imagined and actual outcomes of the project, as seen through the lens of contingency. Two elements were identified as the main contingencies in such projects: (1) the uncertainty emerging from a mismatch between a housing mission's vision and inhabitants' acceptance of the newly built housing, and (2) the variables arising from the fact that newly built housing must meet future climate necessities, for which the existing measures will not be adequate. This framework of contingency has been beneficial in this enquiry in foreseeing that serious issues can arise if socio-ecologically advantageous heat-transfer techniques, such as community courtyards, and their associated behavioural actions, are left out of the new strategies. New policy tools and building codes are providing technical solutions to solve many problems of new construction, but they are limited in addressing the adaptations that existing housing stock requires. Similarly, the adaptation of new buildings is also excluded from strategic consideration in these policy tools and codes. Hence, the permanency of housing, even as it addresses the basic needs of housing, poses a threat of pushing low-income populations into the potential scenario of additional unforeseeable cooling costs in the future.

This research has concluded that the Indian energy ministry's *India Cooling Action Plan* (*ICAP*) presents technological innovation while also keeping technology uncomplicated and accessible to architects by means of new methods.

The *ICAP* is also observed to foster an attitude of learning in the Indian housing delivery system by allowing the realignment and updating of all existing, decentralized building and planning codes in order to adapt to changing energy needs. This openness to learning, however, must also apply when evaluating existing buildings in terms of inhabitants' daily lives. This research illustrates how, despite the poor-quality green spaces in the built manifestation of the Gharkul housing project, greening is well integrated within the daily lives of its inhabitants, who use it to gain essential aspects such as privacy, gardens, hobby spaces, and thermal comfort. Such behaviours must be viewed as innovations, and their potential in helping to avoid future building decay and abandonment must be evaluated. Moreover, the spatial characteristics that encourage such inhabitant-driven greening behaviours can also be used to shape and update new building codes.

A socio-spatial approach to investigating the built environment is acknowledged in this research as an opportunity to delve deeper into adaptability issues. This work can shed light on the material form of buildings in ways seldom undertaken in construction research and practice, as well as bring forward crucial questions and insights for practitioners to consider. In the social sciences, this type of empirical investigation can add to existing theories by supplying knowledge of observable phenomena; for instance, this allows for more specific and robust case studies and more focused testing in process tracing.[14] Post-occupancy evaluations and architectural design assessment, if further developed from existing methods and teachings, can provide definite direction for responsive and adaptable spatial production in low-income housing buildings. In future, a socio-spatial investigation of all 15 model projects could usefully inform new policies and design codes. This research views socio-spatial investigations as an opportunity for organizations to deal with contingencies in a more inclusive and comprehensive way.

14 For more on process-tracing methodology used as a theory-building method that uses initial empirical probing as an important step before engaging in a more focused testing, see Beach and Pedersen (2019).

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10. Exploring the contingency of small-scale urban transformation through interstitial practices at the site of a former war bunker

Clara Da Ros

Introduction

The aim of this chapter is to mobilize the conceptual perspective of interstitiality to explore socio-material practices of small-scale urban transformation. More specifically, I mobilize research insights on interstitial thinking in order to understand the contingent character of micro-sociological practices that take place at the site of a former bomb shelter from World War II in Hamburg, Germany. The particular example of this bunker reveals specific entanglements of past and future through contemporary transformation projects of buildings remaining from history. Through its extraordinary character within the (civilian) urban fabric as a military building, the site of the bunker is approached as a magnifying glass which allows an observation of the unfolding of phenomena involving multiple materialities and temporalities at the same time. Focusing on practices carried out by participants in a civil society initiative at the site of the bunker, I consider these phenomena through the perspective of interstitiality combined with a practice-theoretical approach (Schatzki, 2019; Reckwitz, 2003) to observe the contingency of small-scale, neighbourhood-level transformation of the built environment.

In academic disciplines related to the built environment, the concept of interstitial spaces originates from architectural and urban design scholarship and is most often used to describe spaces of the urban fabric considered as being 'in-between'. An attention to interstitial spaces is of particular importance in a context where defining the urban is no longer limited to the perspective of a cohesive development but is broadened to include consideration of the multitude of configurations that make up contemporary urban space (Matos, 2009:

61–62; Silva, 2022: 177). In other words, the observation of in-between spaces contributes to highlighting the contingent character of urban dynamics.

Contingency implies a lack of predetermination and permanence; it implies uncertainty but also floating possibilities and openness, as in Doreen Massey's understanding of the 'openness of space' (2005), for instance. The concept of interstitiality is relevant for a more comprehensive picture of the contingency of urban life because it offers a view on those urban spaces that exist in one form or another although they were not necessarily intended as such. It could be, for example, that these spaces or buildings have lost their original function, their development has not functioned as planned or has had unexpected consequences, or that they lie at a crossroads, in between divergent spatial logics. These spaces therefore seem contingent by nature: They are there but not always considered or seen as part of the city, they are often the result of planning without having been planned, and they can even date back to a bygone period of planning.

However, as Cristian Silva writes, 'interstitial spaces are not simply empty, undeveloped, or vacant, and although they could remain relatively dormant, they are mainly latent domains that can become highly active while hosting contentious forms of urbanism' (2024b: 4). Following that thought, this research on collective practices at a bunker site looks at how local material practices are an integral part of the constitution and/or modification of such spaces, therefore also contributing to the material and discursive visibility of interstitial spaces within the urban fabric and within the making of urban futures. Indeed, in the context of socio-ecological and future-oriented urban transformations, the role of the inherited urban fabric must be considered. Spaces and structures that can be reused and repurposed are not merely places that have lost their original function. Rather, they are spaces where social meanings and materialities interweave. From this perspective, urban future-making is not only about creating future spaces; it is also about comprehending and accounting for urban legacies as potential places for contemporary socio-material practices of transformation.

This chapter is sequenced as follows: First, I introduce the general concept of interstitial spaces in order to give the reader a bird's eye view on this area of research before considering the interstitial practices of small-scale urban transformation. These are then illustrated by a selection of empirical observations from my doctoral research, focusing on a case study of a former bomb

shelter in Hamburg.[1] I discuss to what extent bunker remains in urban areas can be categorized as interstitial spaces and then present three empirical illustrations of the socio-material practices observed during ethnographic participations at the site: the practice of collective outside cooking, the storage and pickup of vegetables, and the production and storage of seed. In the conclusion, I highlight how the study of interstitial practices allows us to identify material and social actions that emerge in and reshape these in-between spaces by reusing and redefining them in a contingent manner. Combining interstitiality with a practice-oriented lens thus enables a deeper understanding of the practices that consistently change the urban fabric from within, and, through this, pushes for a micro-level approach to urban future-making.

Interstitiality

Interstitial space as an ambiguous concept

In the following, the terms *interstitial space* and *urban interstice* will be understood as related, similar concepts, although there are nuances between them. *Interstitial space* can be understood as a broader umbrella term, whereas *urban interstice* is used to designate and/or qualify the specific intra-urban spaces empirically investigated. It is necessary here to review what is most often referred to by these terms.

Over the past decades, a number of publications in academic disciplines related to the built environment have made reference to interstitial space, gathering under that term works on 'urban leftover spaces' (Tonnelat, 2008), vacant spaces 'rendered invisible' (Foster, 2014), 'marginal', 'ruderal' and 'wild' spaces (Gandy, 2011), oftentimes resulting from the fragmentation between other spatial logics (Matos, 2009). Also, interstitial spaces have been studied in

1 The upcoming doctoral dissertation consists of a qualitative investigation of transformation projects at two Hamburg bunker sites inherited from World War II. The first case – from which the selected data in this chapter originates – is a former civilian bomb shelter reinvested in by a neighbourhood civil society initiative, while the second is a former military combat tower converted into commercial and green spaces by a private investor. The selected data has been collected through ethnographic participant observations between 2021 and 2023 and is part of a broader data corpus including participant interviews, public documents, and site observations of the two bunker sites in the context of my doctoral research conducted at the University of Hamburg.

terms of the reappropriation of space by civil society (Moreau, 2024) – in the sense of Henri Lefebvre's production of space (H. Lefebvre, [1974] 2000) –, often also related to socio-spatial justice issues and urban politization processes (F. Lefebvre, 2021; Sanò et al., 2021) and climate change mitigation (Hugo and du Plessis, 2020). Interstitial spaces have been approached as 'spaces of possibility' in the margins of dominating urban logics, neglectedness leaving room for creative appropriations of the space and 'experimentation of different urban forms, which do not have to respond only to market or planning logic' (Loi, 2024: 2553).

Overall, the term *urban interstices* designates urban 'voids' (López-Piñeiro, 2020: 54), 'vacant lands' (Foster, 2014), and 'gaps' within urban infrastructure (Phelps and Silva, 2018; Silva, 2022). This sample of wordings reveals that such spaces have been approached as *terrains vagues*, in the sense outlined by Ignasi de Solà-Morales as a '[v]oid, absence, yet also promise, the space of the possible, of expectation' (2013: 26). The perspective and terminology of interstitiality is to be understood within the urban research landscape as one of the avenues to study urban voids (López-Piñeiro, 2020: 13). Through that lens, these in-between spaces have gained the attention of urban research, which delineates their constitutive character within various processes of urbanization and highlights the ambivalent nature of vacant urban spaces. These may, for instance, be empty but not useless (e.g. urban wilderness [Gandy, 2011]), functionless but not meaningless (e.g. the liminal spaces around motorways [Loi, 2024]), or in the form of Japanese *roji* alleyways [Imai, 2013]).

Most of the current literature, however, primarily seems to operate from an assumption that what is designated by the language of *interstices* – at times as an adjective, at times as a spatial concept – corresponds to a more or less vague definition of in-between spaces, hovering in some indeterminacy (Hugo and du Plessis, 2020: 592). Additionally, these in-between spaces are often defined as empty (or perceived as empty), abandoned, neglected, or marginalized, and understood as non-places. The condition of vacancy then appears to be the common denominator that classifies all these perspectives under the term *interstitial space*.

It seems, however, that this approach, while surely relevant and rich with insights on leftover spaces, remains somewhat confusing and incomplete. Indeed, in the context of the various ontologies associated with urban interstices (Loi, 2024; Silva, 2024b), dictionary definitions of *interstice* and *interstitial* are not sufficient to establish the term as an operational concept for the social sciences. It remains sometimes unclear whether the language of *interstitial space* is

used to designate specific types of spaces or rather shared characteristics (such as vacancy or in-betweenness). Nevertheless, scholars applying this term have contributed greatly to the analysis of various socio-spatial urban phenomena which draw attention to questions of in-betweenness and what takes place in the 'gaps' (Phelps and Silva, 2018) of the urban fabric. Various authors have therefore taken an interest in developing a more systematic conceptualization of an 'interstitial approach' to urban studies. The following section introduces these propositions.

Interstitial spaces as more than empty spaces

To specify the understanding of interstitial space on a conceptual level, here I highlight recent approaches stating that interstices need to be comprehended beyond the framework of vacancy. In other words: Interstitial spaces are not merely empty spaces (Kärrholm, 2016; Silva, 2024b). In a study of the transformation of retail spaces as an empirical instance of an interstitial phenomena, Mattias Kärrholm writes that the concept of interstitial space encompasses a process. Indeed, interstitial spaces are not merely empty spaces but can also manifest as other forms of intermediary spaces (Kärrholm, 2016) and are 'always a socio-spatial or socio-material process'; this argument therefore underlines that interstitial space is about neither materiality nor sociality but a contingent combination of both (ibid.: 139).

Silva also writes about this necessity of pushing the understanding of interstitial spaces beyond vacancy and to frame 'interstitiality as an interdisciplinary domain for the analysis of […] spatial in-betweenness' (Silva, 2024b: 2). The research agenda for urban interstices proposed by Nicholas A. Phelps and Cristian Silva allows an even more systematic grasp on interstitiality, providing a typology of four aspects of interstitial space (Table 1), characterizing interstices in geographical as well as in social terms (2018).

Table 1: Four aspects of interstitial space according to Phelps and Silva, as in their proposed research agenda for urban interstices.

Aspects of interstitial space	
Scales of interstitial space	Interstices of proximity (small-scale)
	Interstices of transition (metropolitan scale)
	Regional interstices (polycentric scale between cities)
	Interstices of remoteness (non-urbanized spaces between urbanized areas)
Temporal aspect: the pending nature of interstitial space	Past and future productive, economic or speculative value of interstitial space
	Latent social, environmental or ecological value of interstitial space: urban wilderness, green infrastructure, (temporary) socio-spatial usages, and practices by civil society
The (non-)planning aspect of interstitial space	Expected and intended outcomes: planned character of some interstices as 'buffers'
	Unexpected or unintended outcomes: interstices as consequences and as new urban matter with which planning must contend
The paradox of the relational aspects of interstitial space	Apparent absence of relation due to the disconnected character of interstitial space
	Interstices present relational properties nevertheless

Source: Phelps and Silva, 2018: 1209–18.

First, there is the *scalar aspect*, meaning that interstices are observable at different geographical scales. 'Interstices of proximity' are small-scale 'spatial configurations where alternative (out of planned purpose) social practices can occur' (Silva, 2022: 101), 'interstices of transition' are found rather on a municipal or metropolitan governance level, 'regional interstices' represent even wider combinations of local authorities, and 'interstices of remoteness' are defined as the largest scale of interstices, to be found between urbanized areas (Phelps and Silva, 2018: 1210–11). The second aspect is the *temporal* aspect of the interstice, what Phelps and Silva designate as the *pending nature* of interstices, which implies a latency between the past existence of this space, its present state, and its potential further economic development or social reappropriation (ibid.: 1212–14). The third aspect of interstices is their *balancing between*

planning and non-planning, since some interstices can be the expected result of planning and design processes but can also be an unintended outcome. Finally, the fourth aspect of interstices is a paradox of their *relational properties*: What characterizes an interstice is often a form of disconnection or divergence from its surroundings. However, interstices seem to nevertheless demonstrate relational properties as 'urban fragments which are physically separate but connected by lines, channels, mains, pipes and other elements concerned with promoting movement' (ibid.: 1216). It seems that it is even because of their characteristic of not fully belonging to the surrounding spatial types – because of their ambivalence – that interstices act as 'connectors' and why their 'in-between' aspect becomes clear (Silva, 2022: 114).

This typology of urban interstices offers a helpful tool to render the concept of interstitial space empirically useful in identifying what kinds of spaces can be described as interstices in more detail, while still highlighting their ambivalence and contingency in each aspect.

In a 2020 study on interstitial spaces in Tshwane, South Africa, Jan Hugo and Chrisna du Plessis aimed to delineate the potentials of retrofitting urban interstices for climate change mitigation. In doing so, they too developed a categorization of interstitial spaces, though identified seven types: 'underutilized parking spaces', 'roof spaces', 'in-between spaces', 'neglected spaces', 'open plots', 'servitude spaces', and 'other or interior spaces' (2020: 595). The authors' criteria for this typology were a series of morphological and spatial characteristics of interstices which they quantitatively sorted with a focus on assessing the spaces' frequency to which the spaces occurred, and the total area they covered. This emphasized the spatial potential of interstices for urban climate change resilience (as opportunities for small-scale contributions to urban climate adaptation and mitigation strategies [ibid.: 593]). While this typology, through a quantitative approach, offers a possibility for a characterization and differentiation of interstices beyond the mere condition of vacancy or qualification of a space as leftover, I insist on the relevance of furthering the perspective on interstices with qualitative approaches. Indeed, there is, for instance, still a confusion between the generic use of *in-between spaces* as a description for urban interstices and its use as a subtype of interstitial spaces in Hugo and du Plessis' typology. This confusion hinders a clearer understanding of what exactly happens in these spaces that explains their categorization as interstitial spaces and, moreover, as a subtype of interstice.

This is where it becomes necessary to mention that the study of interstitial spaces needs to include further insights into material practices contributing

to form these spaces, for 'a more comprehensive approach [that] render[s] interstitial spaces as environmentally diverse and socially and politically meaningful' (Silva, 2024b: 19). In the present chapter, material practices refer to the social practices exhibited at the bunker site that involve and utilize diverse material elements: the physicality of the bunker itself as well as other materialities mobilized by participants in a civil society initiative present and active at the site. More precisely, my perspective draws from an interest in the social experiences related to the materialities encountered at the bunker site during participating observations in the activities of the civil society initiative's Kultur Energie Bunker Altona Projekt e.V., or (KEBAP e.V.). Referring back to the proposition by Phelps and Silva to understand interstitial spaces through their four aspects (Table 1), it is necessary to gain further empirical insights into the relationality of interstitial spaces. By exploring urban interstices from a practice-theoretical approach that understand everyday practices in their repetitive but also contingent character, as the place of the social (Schatzki, 2002; 2019; Reckwitz, 2003), there is an opportunity for a small-scale observation of how relationalities become apparent when practices are analytically unravelled.

Interstitial spaces as indicators of interstitial practices

Based on the grounds outlined above, I consider the approach of interstitial practices as a conceptual opportunity to combine insights from urban design disciplines as well as from a sociological, practice-theoretical perspective. Using a practice-oriented approach in addition to morphological and spatial analysis allows us to render the concept of interstitiality even more usable to studying the urban environment and urban life from a sociological perspective. Previous research focusing on how practices are a constitutive part of the study of interstitial spatial phenomena underlines the relevance of this opportunity. Wendy E. Steele and Cathy Keys have, for instance, clarified how the interstitial space 'intersects with the everyday practices of dwelling and home' (2015: 113) and therefore have insisted on the importance of considering 'interstitial spatial practices' in both theory and empirical studies (ibid.). In their study on everyday housing practices related to interstitial spaces, the authors therefore argued for a 'greater recognition of people's use of interstitial spaces' (ibid: 123). Silva too underlined that '[i]nterstitial spaces are spatial and political arenas that frame the emergence of interstitial practices' (2024b: 4). Furthermore, Martina Loi advanced the argument, based on her observation of daily practices taking place in the interstitial space around a motorway, that

it may not be a functionless and vacant space but rather generates interstices around itself: 'secondary spaces that are consequently dominated by their massiveness' (2024: 2550). In these spaces, Loi investigated urban interstices generated by a massive infrastructure from the perspective of its users and considered those interstices as '*loci* for other modalities to produce urbanity' (ibid.: 2560). Interstitiality, once again, is then not exclusively a geographical characteristic of certain spaces but is also a quality of both the materiality and the sociality of these spaces.

Following these elements, it then becomes relevant for the sociological study of space to consider not only how interstices appear and are considered by planning and architectural research, but also which practices in relation to them emerge and what these practices reveal about the contingencies of contemporary urban life. For instance, in a study on 'in/formal reappropriation' practices of the interstitial spaces of residential alleys in Melbourne, Australia, Miza Moreau draws attention to the idea that 'we do not need to think of urban interstices necessarily as spaces in between purpose and identity but rather as *underdetermined* spaces where various actors have realized different purposes and potentials' (2024: 1043). The concept of interstitiality can provide sociological thought with further venues. As Theodore Schatzki notes, 'differentiating practices and arrangements subtends recognition that different practices can be carried on amid, with, and through one and the same arrangements and that particular practices can be entangled with multiple arrangements' (2019: 37). In this context, interstitial thinking contributes to an analytical differentiation between arrangements and practices in that it draws attention to the dynamic relationalities and contingencies of what happens within and between urban arrangements. Moreover, from this perspective, it appears that in-between practices, such as those at the bunker site, need to be analytically grasped as constitutive of the emergence and the life of an interstitial space.

Additionally, the approach of interstitiality allows an understanding of the presence of such marginal spaces within the urban fabric not only from an urban studies standpoint but also from a practice-theoretical one. Socio-material practices reveal processes of interstitiality in a small-scale context, characterized by various temporal meanings and in a constant, repetitive practice of in-betweenness. In this sense, drawing on interstitial thinking to approach material practices can be fruitful. Especially in the case of historical buildings that carry political meanings and relate to the politics of memory, such as the bunker from World War II in my case study, I argue that this perspective is rel-

evant to be included in further sociological urban research in order to analyse the meaning(s) of materially reinvesting inherited urban materiality.

The concept of interstitial space has often been referred to and developed in urban design, architecture, and interdisciplinary urban studies literature, but less often in the context of sociological research on urban spatial phenomena and practices. According to Kärrholm, '[d]espite the interest shown by some architects in the concept of the in-between and the interstitial, the concept has not been theoretically developed or thoroughly investigated in terms of its function for urban life. […] In order to make the concept of interstitial space effective in discussions of architecture and everyday life, we need to be more precise about its meanings and objectives' (Kärrholm, 2016: 136). Taking up this argument, we can draw more attention in the field of sociology (of space) to the study of interstitiality with regard to collective material practices at urban sites. Since researching meanings and relational processes running through various moments and places of social life is one of the core objectives of sociology, it appears necessary to join Kärrholm's argument and to explore the concept of interstitial spaces from a sociological perspective. In the following, I lay out selected empirical illustrations from the reuse of the bunker to examine how the concept of interstitial space can be applied to small-scale urban transformation dynamics and extended to interstitial practices – in this case, practices of appropriation and change taking place at an historical site.

The bunker as an interstitial site and the role of interstitial practices

As a leftover from history, the bunker in Schomburgstraße in Hamburg embodies the idea of an interstitial space that is not an empty *terrain vague*, but an abandoned building, having lost its original function and located in between other spatial logics (e.g. the park, the residential areas, the city streets) and awaiting potential new purposes. At the same time, it is a massive structure constructed to withstand the blasts of explosives. Its openness and flexibility are therefore limited, necessitating substantial financial and technical investments for reuse or conversion projects. In the following, I discuss the extent to which the investigated bunker case can be considered as an interstitial site.

Figure 1: View of the bunker in Schomburgstraße (Hamburg), seen from Walter Möller Park, June 2021.

Source: Author.

Between all the types of spaces studied in relation to interstitial space (margins, *terrains vagues*, cracks, gaps, borderlands, urban voids, margins, non-places, and leftover, abandoned, neglected, overlooked, or dormant spaces, etc.), Steele and Keys draw a connection: 'Common to all of these is that interstitial space is hidden, grey and ambiguous' (2015: 113). A former high-rise war bunker can itself be considered as a hidden, grey, and ambiguous urban interstice: As a remnant from World War II, this grey building, decommissioned of its original function,[2] seems like an unmovable leftover, disconnected from the surrounding civilian urban fabric (Figure 1). Of such

2 Bunkers from World War II are generally considered as having lost their original function simply due to the end of World War II. Additionally, in the 80 years since 1945, various bunkers have experienced transformations, reusages and/or abandonment, necessarily replacing their original function planned by the Nazi regime during World War II. The former bomb shelter examined in this chapter was used as a storage building in the 1950s, then upgraded to a nuclear shelter during the Cold War, before being decommissioned from the civilian protection programme (*Zivilschutzprogramm*) in 2014 and sold by the federal government to the city of Hamburg in 2020.

bunkers, those that have not been destroyed, removed or converted into new usages since 1945 appear like in-between spaces, not quite fitting into the landscape of the contemporary city.[3]

In a first tentative step, I therefore categorize remnant bunkers in urban areas themselves as a type of urban interstice. On the one hand, this is because of their architectonic features and appearance differing from the usual urban environment, separating them from their immediate surroundings. Although they are obviously a very different type of built environment than motorway infrastructures, bunkers similarly carry an 'extreme normativity' (Loi, 2024: 2560). Even though bunkers are materially built from concrete, a usual material in cities, they still diverge from other concrete buildings: Their walls are several meters thick and windowless, their ventilation and pipe systems serving solely as a hope of survival during bombardments, and their layout and technical equipment sometimes intended for storing munitions and transmitting fighting orders (in the case of military bunkers[4]). In other words: They are an architecture of war, built for military purposes, not for urban life. As a *fortification*, in the sense of Derek S. Denman, bunkers answer to a specific spatial logic as a 'technique of power in which warfare, the design of the built environment, and the organization of space are intertwined' (2020: 231).

On the other hand, bunkers can be seen as interstices on a symbolic level: As historical remnants, they form an interstice, a space in between times, a leftover from history, inherited from the very specific context of war, rendered functionless by the end of World War II and by the passing of time. Similar to various bunkers from the Cold War, former World War II bunkers can be considered as urban ruins carrying historical and political meanings (Bennett, 2017). In a study on bunker remains in the Channel Islands, Gilly Carr refers

3 It is necessary to mention here that a number of former bunkers which have already been converted into office or apartment buildings, often by the use of additional stories or partly renovated facades, could be instances that seem to question my argument here. However, I still argue that even those transformed and inhabited bunkers can be approached as peculiar components of the overall urban fabric, since oftentimes the construction works have left parts of the original building apparent, making even the renewed building a specific element of the areas they are located in (illustrative instances in Hamburg can be found, for example, in Barmbeker Straße 185 or Heussweg 114).

4 Further research insights on the case of the conversion of a former military bunker (combat tower) from World War II will be published as part of the upcoming doctoral dissertation by the author.

to such leftovers as 'scars of occupation' (2010). Former World War II bunkers in Hamburg can be considered in a similar manner: as marks from a violent, totalitarian, and fascist past inscribed not only in the history of the country but also in the urban fabric of a metropolis.

Beyond considering the bunker itself as an urban interstice, we can also observe contemporary social practices taking place at the bunker and how these reinforce its interstitial character. There are two reasons for this: First, as Kärrholm and Silva encourage, is to move beyond an application of the category of the interstice which is too often based almost exclusively on aspects of architectonic isolation within the urban environment and on functionlessness. On this basis, linking the interstitiality concept to a sociological approach of practices carries the potential of revealing additional characteristics of urban interstices. Second, a variety of bunkers have already been converted to fulfil new functions (real estate, power plant, museum, retail, etc.), and others – such as my case study here – are becoming places of spatial reappropriation practices that highlight the potential of reusing historical structures as part of urban social-ecological transformations. Within this diversity of bunker conditions, it seems that we cannot speak about bunkers in a homogeneous manner and categorize them generally as interstices but rather that we should approach each of them with an attention to its specific situation. Moreover, some bunkers may appear empty physically, but most are usually still permeated with the heaviness of historical meaning and debates around the politics of memory. This heterogeneity of situations calls for a more detailed analytical approach and is reminiscent of the ambiguous aspect of interstices already mentioned by Steele and Keys (2015: 113). The aim is to choose an approach that provides both precision for each empirically studied site and a comprehensive overview of the interstitial mechanisms that may enfold at historical sites, hence to look at practices and not merely the morphology of interstices to obtain more detail and data while retaining the possibility of conceptual abstraction.

The empirical instance of the bunker-reusing project in Schomburgstraße is indeed an example that underlines the possibility that interstices are not only 'foci of futurity and planning imaginations around "the city to come", which speak on their transitional stand towards being urbanized' (Silva, 2024a: 39; quoting Fields, 2023).

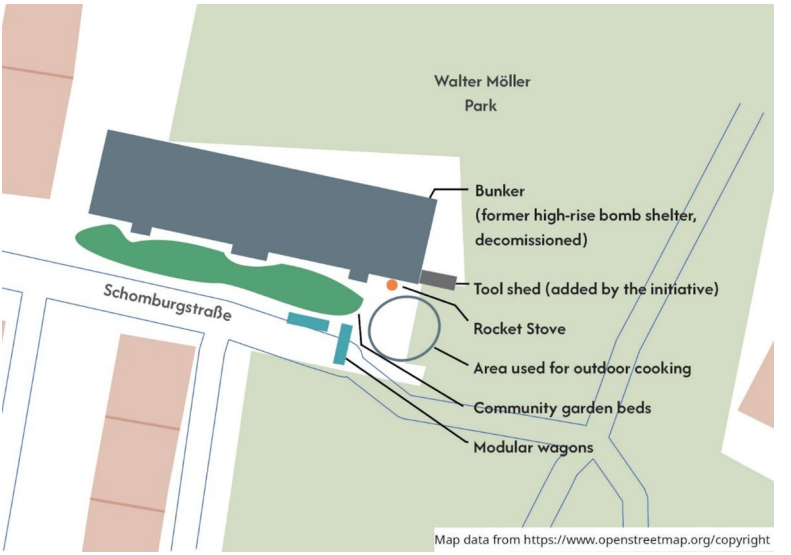
They are also more generally *foci of temporalities* of urban materiality, since they harbour within their now-interstitial character inherited architectures alongside memorial and political meanings, as well as present practices and

future projections.[5] As in Phelps and Silva's typology detailed above (Table 1), temporality is one of the main characteristics of interstitial spaces, in that the existence of these spaces as leftover underlines their origin(s) in the past but the contemporary latency around them implies potential future usages at the same time. In the socio-material context of reusing a former war bunker, the investigated activities render visible multiple times and multiple social meanings associated with the bunker building. As interstices, sites such as the investigated bunker do not merely operate as a focal point of futurity, in that it is being reused for urban transformation purposes; it also functions as a focus of legacy through its historical character and curation activities. The example of the bunker in Schomburgstraße may be a peculiar and rare one; however, I argue that this does not make it any less relevant, for multiple other types of spaces may bring a similar inherited character into the urban fabric, and the study of urban futures cannot (and should not) bypass them.

Figure 2 shows a site map of the investigated bunker site and its on-site practices, as described in the following section, which presents preliminary observations of a selection of some of the activities carried out by the civil society initiative Kultur Energie Bunker Altona Projekt e.V., or KEBAP e.V. The initiative originally started its activities in protesting a coal plant in 2009. Departing from its intention to develop alternative possibilities for energy and heat production, participants started making plans to convert the bunker in Schomburgstraße as a potential heat plant for the neighbourhood. This goal being a long-term and resource-intensive endeavour, the initiative then organically evolved around additional activities in order to engage with the neighbourhood and interested visitors even before completion of the energy plant. After investing the area surrounding the unused bunker with urban gardening beds and modular wagons, the initiative gained access to the indoor spaces of the bunker in 2016. Today, it organizes around multiple goals, ranging from more overarching transformational goals such as the heat plant project to a rooftop garden, cultural offerings for the neighbourhood, and an historical exhibition.

5 A more detailed development of this topic will be published in the upcoming doctoral dissertation by the author.

Figure 2: Site map of the bunker area.



Source: Author; illustration created from map data from OpenStreetMap, https://www.openstreetmap.org/copyright, accessed via Cadmapper, https://cadmapper.com/.

Collective outside cooking

The first empirical example of interstitial practices at the bunker site is the collective activity of outdoor cooking offered by the initiative approximately once a week during the gardening season, usually following afternoon gardening activities. It is open to all: members, visitors, and sometimes even passers-by who spontaneously join in. On the occasions where I participated in this collective cooking, the group usually consisted of only a few people; however, I also experienced some busier days where 10 to 15 people came – especially on sunny days.

Figure 3: A view of the collective area set up at the foot of the bunker.

Source: Author.

In Figure 3, one can see the space where the meals took place:[6] The table and some of the supplies are already prepared, and the garden is visible in the background, along the bunker wall. As much as possible, the meals are chosen depending on what is currently possible to harvest in the garden, or at least are based around one ingredient from the garden. The most exemplary recipe during my visits to this event was a pumpkin soup with a homemade orange spice mix, especially agreeable on mild late summer and early autumn days. The meals are cooked using a rocket stove (Figure 4). Built by the initiative, this

6 The white pergola visible in the picture has since been removed by the district authorities.

low-tech wood-fired stove gives a sort of camping atmosphere to the activity, and a sign with the word *Stadtteilküche* (neighbourhood kitchen) hanging above the stove reveals how the initiative considers this collective cooking activity: as an offer directed at the neighbourhood, as a social space for residents. While one or two people were responsible for starting up the stove, others were doing the chopping and preparing of ingredients, using kitchen utensils stored by the initiative in a modular wagon installed along the sidewalk (Figure 2).

Figure 4: A view of the rocket stove while cooking.

Source: Author.

What, then, is the interstitial aspect of cooking outdoors? For the duration of one late afternoon, a dinner is served outside, and it takes place not at a restaurant terrace but rather at a location similar to a camping site, with a

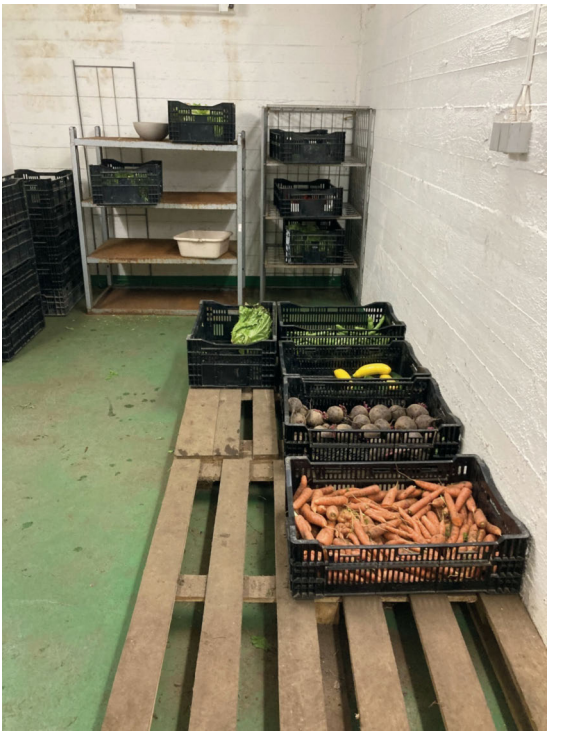
bit more equipment. The tables and kitchen utensils are brought out, the vegetables and drinking water are gathered, the rocket stove chamber is opened, the fire is started, and the space is opened to members and passers-by. There is the cooking, the eating, and the cleaning of dishes with the remaining drinking water, then everything gets put away, the rocket stove and the wagon closed before participants leave the space. Between afternoon and evening, this place at the foot of the bunker becomes a dining room. And this occurs on a regular basis, between the bunker and the street, both inconspicuously and openly. Additionally, the modularity of most materials used (the wagon, the rocket stove, the tables) is a materialization of an interstitial practice because it makes things appear and disappear again: They take space now and then, unfolding in a social situation.

Storage and pickup of cooperative agriculture deliveries

The second example is a storage room inside the bunker, where produce is delivered from an agriculture cooperative outside of Hamburg, an action that also takes place on a weekly basis. Figure 5 shows this room on the ground floor of the bunker, where the vegetables are stored, waiting for neighbourhood members to come by and pick up their share. This means that inhabitants of the neighbourhood who have a share in this agricultural cooperative come by the bunker once a week or once every two weeks and pick up their basket of vegetables. These members of the neighbourhood are not necessarily also members of the initiative, although some are. Imagine a person interested in supporting local agriculture in order to contribute to a more sustainable future, buying a yearly share supporting a farming cooperative near their city. The relay point to pick up the weekly or bi-weekly delivery is located in a former war bunker, which in turn means that perhaps every week, this person, for five to ten minutes, steps into a cold, silent, unusual building that maybe makes them think of history and of past totalitarian violence. This does not mean that members of the cooperative think about the bunker's history every time they visit; over time, the bunker has probably become a familiar place to them. At the same time, the bunker's cold temperatures make it an ideal place to store fresh produce. This scenario shows the presence here of a form of in-betweenness that is probably quite subtle yet nevertheless intriguing: A fleeting moment in-between, encompassing the temporal materialities of the weekly vegetables and the substantial concrete walls of the bunker. Through the practice

of picking up, the room inside the bunker becomes part of the members' urban spatialities.

Figure 5: A view of the storage room for the vegetables delivered by the agricultural cooperative.



Source: Author.

The Norddeutscher Saatgutbunker: Seed production and storage at the bunker

The third example is the production of seed in the garden, which is then stored in the bunker. Every gardening season, not only are fruits and vegetables harvested: Seed production is also a part of the gardening practice. During collective workshops, the initiative invites participants to collect seeds from the

garden plants, both edible and ornamental. This workshop usually takes place in the fall, and under the guidance of a well-versed volunteer, participants learn to harvest the seeds, which are then sorted into envelopes and filing systems to then be stored in a small room in the bunker. The seeds are stored in the bunker because the building offers stable temperatures throughout the year (due to its thick concrete walls), which are suitable for seed storage. Should the humidity levels be too high in the building because it still is not insulated as a 'normal' building is, the seeds are temporarily moved to one of the modular wagons owned by the initiative. Harvesting its own seeds allows the initiative to grow plants in subsequent gardening seasons, or to exchange seeds with other local initiatives during a so-called *Saatgutbörse* (seed market). However, some of the seeds, for instance, wildflowers that are a good fit for bees, were intended to be shared with the public at various events to promote biodiversity, supporting wildlife such as bee populations, and distributed in small packages with the designation 'Norddeutscher Saatgutbunker' (North German Seed Bunker) printed on them.

Categorizing the bunker site as interstitial space harbouring interstitial practices

These three empirical instances underline a specific component of the interstitial space of the bunker site: the material practices carried out throughout the space. Indeed, these examples bring to the fore the important role of material practices in the formation of a hybrid space, harbouring activities that juggle various matters and temporalities. In a routinized manner, these practices mobilize a variety of materialities: By practicing gardening, cooking, and storing seeds and vegetables around and in the bunker, they make use of the premises of the historical building as well as added elements such as modular installations, gardening tools, storage units, and so on. Regarding the aspect of temporality, the activities practiced alternate between modifying the bunker's space and 'leaving it', through modular and temporary albeit repeated usages.

Circling back to the conceptualization by Phelps and Silva (Table 1), these observations of interstitial practices provide evidence regarding the four aspects of interstitial space:

(1) Concerning the *scalar aspect*, the investigated bunker site can be categorized as an interstice of proximity, due to its geographical location within a neighbourhood and the local civil society's engagement with it. More than

just owing to its location, it is also characterized by the initiative's clear ambition to carve out a small-scale, neighbourhood space, available to members as well as to passers-by.

(2) Regarding its *temporal and pending nature*, the bunker itself, as an historical artefact, testifies to its former function, the memory of which still lingers within its walls. Additionally, the bunker site as a place of spatial reappropriation, with temporary, regular, and modular usages through the initiative's activities, reveals its 'latent social, environmental or ecological value' (Phelps and Silva, 2018: 1213). The Kultur Energie Bunker Altona Projekt e.V. initiative developed around a main goal and then successive additional activities such as the installation of the garden on the sidewalk while awaiting access to the bunker's indoor spaces, and the installation and regular use of the modular wagons, taking advantage of their more or less temporary condition. The current state of the bunker is itself a mix of pending projects, whether it be the regular practices carried out or the overall transformation goals that are in continuous planning by volunteers.

(3) This leads us to the *(non-)planning aspect* of interstitial space: Although the bunker is the result of a planning process during World War II, its current state and usage is the result of a succession of semi-planned evolutions of the initiative's activities, the main one being the bunker's reappropriation by an initiative initially devoted to sustainable energy production but which has evolved into working to turn the space into a neighbourhood offering while curating its historical meaning. Overall, the initiative revolves around a number of objectives, all linked together by the ambition to achieve local sustainability through collective planning and negotiating processes.

(4) Finally, regarding the *relational aspect*, observing the bunker reuse as an interstice helps to reveal how the bunker relates to its surrounding environment: Throughout vegetal and social practices at the site such as gardening and outside cooking, the bunker is set in relation to the neighbouring park, the sidewalk, the street, the passers-by, and, more generally, established as a neighbourhood place. Additionally, the practice of storing vegetables puts both the bunker and the members of the neighbourhood in relation to the city's agricultural surroundings and the initiative's partnering agricultural cooperative. Similarly, the production and storage of seed becomes a hybrid connection between the materialities of the garden, of the bunker, and of the participants' practices, including their knowledge production and sharing of botanical processes and temporalities. Therefore, the exam-

ple of the bunker site not only 'qualifies' as an interstitial space within the urban fabric but also reveals that its contemporary constitution arises from *interstitial practices*.

Conclusion

> [T]he massive materiality of the infrastructure and the way it interacts with space makes the emergence of interstices possible.
> *(Loi, 2024: 2560)*

In a manner similar to – yet also distinct from – the motorway in Loi's work, the bunker in Hamburg presents itself as a specific form of urban interstice. As a leftover from history, it is simultaneously an overlooked place and a massive materiality, rendered (seemingly) functionless by time but not devoid of historical and political meanings. Departing from the idea that the bunker itself can be framed as an urban interstice, the selected observations from Hamburg revealed material practices that I proposed to characterize as interstitial practices. I argued that not only the space as a whole can be approached using the lens of interstitiality, but also the practices taking place in the context of the reappropriation of the space. Studying interstitial spaces through investigating their associated interstitial practices also supports attempts to render the contingency of urban future-making visible, since 'interstices *cannot be known in advance*: the interstice is not simply a physical place, but very much a phenomenon "on the ground", a "happening", a "combination" or an "encounter"' (Brighenti, 2016: xviii). We can observe this phenomenon unfold at sites such as the bunker case presented in this chapter, where urban futures are woven into present practices and envisioned through the reappropriation of a place from the past and adding a new layer of meaning(s) to it. Another insight from this case is that reappropriation projects of inherited spaces must contend with complex material structures as well as with temporal and political meanings.[7] A reflexive and critical approach is necessary for reinvesting in such spaces, particularly in the case of buildings with violent histories. The new layer of meaning generated by future-oriented material practices does not

7 A more in-depth development of these aspects will be published in the upcoming doctoral dissertation by the author.

suppress the bunker's previous layers of meaning. Adopting the lens of interstitial spaces and practices reveals these multiplicities, which are significant elements to consider when studying the social dynamics of urban future-making in relation to the inherited urban fabric. Therefore, not only can the approach of interstitiality be applied to sites such as the bunker; such an approach also presents an opportunity to be combined with a sociological practice-oriented perspective through interstitial practices. Through the observations in this chapter, I hope to have awakened an interest in increased dialogue between the interstitial approach and a practice-oriented perspective. This will allow us, by investigating micro-practices of change, to grasp with ever more detail what is concretely happening at these interstitial sites.

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11. Future-making in a mode of standby

Everyday planning and the precarious futures of the Hochhausscheiben in Halle-Neustadt

Hendrikje Alpermann

Introduction

The future's inherent opacity and contingency find their way into the present through practices of anticipation, preparation, precaution, and preservation (Anderson, 2010; Samimian-Darash, 2013, 2023; Bryant and Knight, 2019). Cities, as dynamic sites of socio-political and economic convergence, are central arenas where the uncertainties coming with global transformations are both confronted and navigated. This chapter explores how the built environment and, more specifically, vacant buildings, serve as key spaces for engaging with possible futures. In particular, it examines the everyday practices of future-making among urban planners, exploring how they navigate the complexities of shaping possible futures within the constraints of the present (Abram and Weszkalnys, 2013; Abram, 2014).

To ground this exploration, the chapter investigates the specific case of the high-rise ensemble 'Hochhausscheiben A–E', located in the centre of Halle-Neustadt, a district of the eastern German city of Halle (Saale). Halle-Neustadt, with around 47,000 inhabitants in 2022, was built as the socialist model city Halle-West, an independent city mainly for the workers of the local chemical industries. After German reunification in 1990, Halle-Neustadt was incorporated into the city of Halle and is today the city's largest district.

Once emblematic of socialist urban planning and marking the centre of Halle-Neustadt, the Hochhausscheiben fell into disuse in the late 1990s and have since existed in a 'standby' mode. Standby: The term is most commonly associated with technical devices, but emergency services, delivery drivers, and other professional groups are also familiar with these moments when their full

function is not utilized, when they are not immediately needed but ready for reactivation. Building on a proposal from Laura Kemmer, Annika Kühn, Birke Otto, and Vanessa Weber (2021), the concept of standby serves as a theoretical lens to understand how the Hochhausscheiben occupy a state of in/activity in an enduring present in which the making of possible futures is in tension with their non-realization.

Figure 1: Hochhausscheiben A–E, 1974.

Source: Dorenkamp, Geschichtswerkstatt Halle-Neustadt.

I will briefly trace how these buildings came to be 'on standby': The high-rise buildings, simply named A, B, C, D, and E, form an ensemble of five towers built in the early 1970s (Figure 1). They were originally designed as dormitories for workers and students and became a symbol of the socialist model city constructed to the west of the existing city of Halle (Saale). The upheavals two decades after the Hochhausscheiben were built had a profound effect on their purpose and use. Following the *Wende* – the GDR's collapse and Germany's reunification – the post-socialist transformation of Halle-Neustadt was accompanied by a reorganization of ownership, maintenance,

and planning. Under socialism, housing was controlled by the state, but after 1990, Halle-Neustadt's housing stock was gradually marketized (Bernt et al., 2017: 560). The Hochhausscheiben changed ownership and were auctioned off several times and lost their original use by 2000. Building D, however, was an exception: Renovated in the 1990s by a private investor, it continued to serve as an office tower – a function it had already fulfilled during the GDR era. Building C was sold to a private owner in 2015 after being owned by the state of Saxony-Anhalt. The post-reunification years left the high-rises 'in-between', caught between demolition and preservation, forcing planners to rethink their role amid economic and demographic upheaval. Reflecting on the start of this ongoing process, one planner I spoke with recalled the optimism that prevailed despite the challenges: 'It will be okay … yes, it's difficult now, but it will be okay' (interview, 25 October 2018).[1] However, scholars in the 1990s warned of the area's uncertain future, highlighting the complexity of urban, social, and political issues (Projektgesellschaft mbH Dessau, 1993). This period of privatization, regulatory liberalization (Bernt et al., 2017: 560), and processes and events beyond their control overwhelmed planners, who lost control over the future of the buildings that had become sites of loss, devaluation, speculation, neglect, and unrealized potential. The buildings became symbols of the collapse of socialist urbanism and the challenges of shaping urban futures under neoliberal pressures.

Ever since the Hochhausscheiben in Halle-Neustadt began to fall vacant in the 1990s, they have sparked debates about their future – debates that intensified around 2000, when the buildings stood entirely vacant. This chapter explores how planners have engaged with these buildings, investigating how the future is made, negotiated, and imagined in a mode of standby. Standby is not mere inactivity, but a readiness to act when conditions are right, requiring a constant investment of energy and attention despite uncertain outcomes. This mode of being – both on and off, suspended and yet prepared – embodies a paradoxical state where uncertainty forces action and negotiation. It is a future-oriented mode in that it 'refers to that which comes next' (Kemmer et al., 2021: 15), yet one in which the future remains elusive and potentially unattainable due to the precariousness of the present, disrupting linear notions of time, and requiring something akin to what Michael G. Flaherty (2003) describes as 'time work': ongoing efforts of future-making and a constant negotiation of

1 Interviews were conducted in German; interviews and non-English quotations have been translated by the author.

temporal horizons while remaining ready for multiple possible futures. Scholars such as Felix Ringel (2018) highlight how uncertainty and indeterminacy often provoke, rather than inhibit, agency. Building on these insights, this chapter frames standby as mode of preparedness that actively keeps futures open.

Based on ethnographic research conducted in 2018 and 2022 involving archival work, observation, day-to-day conversations with urban planners in Halle, and interviews with key actors, this chapter explores how planners navigate uncertainty and maintain the potential to reactivate vacant buildings. It argues that 'standby' captures the ongoing, precarious efforts to preserve potentiality while awaiting investment or opportunity, and that the recurrent un/making of possible futures for the Hochhausscheiben contributes to the openness of the future within the constraints of the present. The Hochhausscheiben exist in a liminal state, where futures are continuously made and unmade, reflecting the precarious interplay between stasis and change. Planners expressed unease during discussions, highlighting the cyclical nature of unresolved debates and the frustration of revisiting the same issues for decades (group discussion, 6 February 2020).

The first analytical section analyses scenario-building as a key future-oriented practice, exploring the uncertain and unknowable future and its role in envisioning possibilities for the Hochhausscheiben. Then, the chapter explores how planners navigate between distant futures and long-term goals on the one hand, and short-term measures on the other, as they translate visions for the centre of Halle-Neustadt into tangible actions. Ultimately, the chapter shows how the present moment is both rendered indeterminate and laden with potential. By examining the practices that keep the Hochhausscheiben 'in play', this chapter contributes to a deeper understanding of the interplay between aspiration and pragmatism in post-industrial and post-socialist settings.

Planning and the (unforeseeable) future

To explore how the future is made in standby, I draw on insights from planning theory, science and technology studies, geography, and anthropology. Time – and the future in particular – has received renewed attention in the last few years across disciplines. This growing interest stems, on the one hand, from the fact that the study of the social has long neglected time and temporalities and, on the other hand, from a pervasive sense of uncertainty that has deepened recently, in line with the precarious, crisis-ridden, and rapidly changing

present. Contemporary research explores 'how we know and, more specifically, how to gauge and act on unknown futures' (Alexander and Sanchez, 2018: 4). New attention is being paid to ways of relating to the future and (re)acting to it in the present, as well as to practices of crafting, enabling, and reclaiming time and the future (Ringel, 2014: 68).

Ben Anderson argues that the future is increasingly seen as indeterminate, uncertain, and unknowable (2010: 793). He highlights how the fact that the future will 'exceed present knowledge' (ibid.: 780) has become integral to practices of anticipation and preparedness. The unknowability of the future – and, as I will explore, its *unplannability* – does not reduce its significance. On the contrary, high levels of uncertainty and contingency encourage rather than suppress 'temporal agency' (Ringel, 2018: 71). However, these practices appear to diverge from modernist approaches to the future, which were based on the belief that, even if the future did not unfold as expected, it could still be planned. As Abram (2017: 79) argues, understanding how people imagine, plan for, and act on the future offers valuable insights into life today, highlighting the need to study how relations to the future shape present practices.

Anthropological perspectives on time and action are particularly valuable for understanding future-making in standby, as they have long focused on the interplay between time, action, and space (Gell, 1992; Munn, 1992; Rabinow, 2008; Abram, 2014, 2017). Nancy Munn, for example, expands upon Johannes Fabian's concept of 'temporalization' to explore how 'we make, through our acts, the time we are in' (Munn, 1992: 94). This perspective emphasizes how people inhabit a socio-cultural time composed of interwoven dimensions, experienced through the ongoing creation of meaningful connections between people, objects, and spaces in daily life (ibid.: 116).

Recent work on future-making highlights the active, skilful production of time and the future, illustrating how temporal dimensions are continually shaped and reshaped through human practice (see Thiel and Grubbauer in this volume). Calling attention to agency, some researchers argue that representation itself is an act of creation (Simpson, 2008: 810), actively shaping particular pasts, presents, and futures through, for example, 'techniques of time' (Bear, 2016: 489). Ringel introduces the concept of 'temporal agency' to analyse how individuals and groups act upon time and the future. He examines practices that – through specific imagined futures – have transformative effects on time itself, such as accelerating or decelerating processes. 'Future-tricking', as Ringel calls it, includes activities such as 'predicting, forecasting […] projecting or envisioning […] designing, budgeting, aligning, organizing or coordinating'

(Ringel, 2016: 26), all of which aim to direct the flow of time towards desired outcomes. Similarly, Jeroen Oomen, Jesse Hoffman, and Maarten A. Hajer introduce the notion of 'techniques of futuring', which bridges '*imaginative work and practices*' (Oomen et al., 2022: 254; emphasis in original). They define 'futuring' as 'the identification, creation and dissemination of images of the future shaping the possibility space for action, thus enacting relationships between past, present and future' (ibid.: 253–54). Studying the role the future plays out in the present, Anderson (2010) explores how 'action upon a future that may never happen' (Anderson, 2010: 777) – pre-emption, precaution, and preparedness – shapes and is shaped by governance and social practices.

When it comes to planning, future orientation and acting on the future are inherent (Abram and Weszkalnys, 2013). Planners are often required to 'foresee future scenarios, and to try to pursue the best among the options' and '[think] about ways and strategies to avoid unwanted, undesirable outcomes' (Pizzo, 2015: 137). To this end, 'planning entails a broad set of tactics, technologies and institutions to try to control the passage into the future, including practices and ideas' (Abram and Weszkalnys, 2013: 2), 'ascertaining predictabilities and attempting to secure them by design' (Abram, 2017: 66). Planning thus involves techniques of temporal agency, where planners engage in practices to influence the progression of time, whether by accelerating, decelerating, or otherwise reordering temporal processes (Ringel, 2016).

This theoretical framework will guide my analysis of scenario-building, navigation, and the production of indeterminacy among urban planners in Halle. These practices reflect how planners engage with uncertainty and contingency, leveraging them to keep the future open while seeking to shape it in line with their broader goals of preservation and revitalization.

Scenario-building: Bringing the future into the present, keeping it open

Within the planning unit, my interlocutors engage in different forms of future-making, of which scenario-building stands out as a key practice. In planning scenarios for the vacant high-rise buildings, urban planners assemble different possible futures, considering material form, ownership, cost, architectural value, and so on. Over two decades of vacancy, the high-rises in Halle-Neustadt have been the subject of multiple, albeit finite, scenarios.

In 2013, for example, Halle's planning unit worked with Saxony-Anhalt's Competence Centre for Urban Redevelopment (Kompetenzzentrum Stadtumbau) on a brief for an external architecture firm to explore possible building futures. A first draft proposed either 'preservation' or 'demolition', with subdivisions under preservation such as 'securing', 'interim uses', and 'new uses', while demolition included 'reorganization'. The aim was to assess both the feasibility and potential demand for each scenario.

Scenario-building, as described above, enables planners to bring the future into the present (Adams et al., 2009: 249; Anderson, 2010: 784–85), playing a crucial role in un/making possible futures for buildings. Rather than predictive tools, scenarios are plausible narratives and tools for exploring possible, probable, and preferred futures and what might happen under different conditions, enabling planners to ask 'what if' questions that are grounded in current realities yet open to contingency (Adam and Groves, 2007; Yaneva, 2009: 164; Samimian-Darash, 2023). Scenarios rest on current conditions while anticipating future changes shaped by shared knowledge and assumptions about key drivers such as technological change or pricing trends (Adam and Groves, 2007: 202). In planning, this often includes the evaluation of specific buildings in relation to other buildings and places (Macmillen and Pinch, 2018: 306) but also to supply-and-demand logics. This sensitivity to context and surroundings can be seen as a form of embodied knowledge – developed not only through formal training but through repeated, situated encounters with urban space. Furthermore, standard components of scenario-building include SWOT analyses and tripartite structures typical of bureaucratic planning.

Planning theory views anticipatory inquiry as activating potentiality – an experimental form of 'thinking otherwise' that focuses on possible outcomes not for the purpose of, but to remain vigilant to unknown possibilities (Gilles Deleuze, quoted in Hillier, 2011: 32). Through these 'what if' stories, the unknowability of the future is met with multiple possible futures. As Louis Albrechts puts it, 'The scenario derives from the observation that, given the impossibility of knowing precisely how the future will play out, a good decision or strategy to adopt is one that plays out well across several possible futures' (Albrechts, 2005: 255). This opening up of the present to a range of possible outcomes – the belief that new possibilities emerge from this openness – is today embraced not only by planning theorists and post-structuralists, but also by practitioners in the field. It is often seen as linked to optimization (Adams et al., 2009: 258), neoliberal regimes, and the unknowability of the future (Anderson, 2010). As Vincanne Adams, Michelle Murphy, and Adele E. Clarke (2009:

258) argue, anticipation predicts opportunities for what once seemed impossible, leveraging 'new spaces of opportunity' and reconfiguring 'our sense of "the possible"' (ibid.: 258).

In the case of the Hochhausscheiben, too, scenario-building is about exploring new spaces of possibility in a situation where possibilities are limited. The future of the high-rises will depend on new possibilities because, for example, only new uses and demand may be feasible in making revitalization a real option, considering the oversupply in the housing market in Halle-Neustadt. Or it may be that only new financing options can attract investors.

Working on the scenarios in 2013, tensions arose between the city and the state of Saxony-Anhalt over how to link present and future. The state revised the city's draft, replacing 'fundamental options' with 'realizable options' and eliminating what were deemed economically unfeasible scenarios. While the city aimed to let the future guide present actions, the state insisted on grounding future visions in current constraints, revealing contrasting approaches to time and the future. Indeed, scenario-planning as a collaborative act appears here less as an 'open debate about future ideals' and more as 'a battle over the here and now, and between different continuities' (Abram, 2017: 74) or discontinuities. The city of Halle wanted to open up the present with the future, while the state, which owned one of the high-rises and wasn't willing to invest in the site, saw the future closed off by the present. Drawing on this situation, we might suggest that within scenario-building, coexisting futures 'are similarly scaled and contested, filled with competing notions of idealism and pragmatism' (ibid.: 66, 77). The city's aim in anticipating multiple futures was to open up the present to (new) possible 'courses of action in the face of ongoing contingency and ambiguity' (Adams et al., 2009: 255).

In the following years, commissioned architectural studies explored possible ways to wrap and rehabilitate the buildings. One of these studies was by the architecture firm Lacaton & Vassal (with Fischer), which theoretically demonstrated that revitalization could be an economically reasonable option. Subsequently, in 2015, the urban planning department again drew up possible futures, again covering the spectrum from demolition to conservation. The scenarios were then redefined as 'possible solutions' by the city administration's planning unit and incorporated into efforts to create a comprehensive concept. Each of them was assessed in terms of opportunities, risks, and costs, as well as urban design parameters, architectural feasibility, and the need for coordinated action between all property owners.

An internal document from January 2015 then outlined three scenarios. The first, the 'zero variant', required no additional administrative effort, though planners saw little chance of private redevelopment and anticipated ongoing costs of securing or possibly demolishing the buildings. The second, 'demolition and reorganization', estimated €13 million to demolish buildings A–C and E, with land sales expected to yield only €100,000 to €200,000 per plot and low prospects for subsequent use. The third, 'preservation and development', gave projected costs of €12 to €18 million per building, not including surrounding areas. The document also detailed municipal tools and measures to facilitate each scenario, including development plans, regulatory enforcement under Saxony-Anhalt law, or the use of an estate liquidator for building A (internal document, 14 January 2015).

These scenarios served to guide political decision-making, and while the city appeared to be exploring multiple possible futures, the process suggested an intention to steer towards preservation. Based on criteria such as opportunities, risks, costs, urban design and architecture, coordination between owners, and the estimated expense per building, the 'status quo' was seen as the least favourable, while 'preservation and development' was seen as the most favourable, despite being the most costly. Finally, a city council resolution from 2015 recommended the preservation scenario,[2] confirming the city's commitment to that path. So, in 2015, the scenarios seemed to serve a decision-making process and the definition of a preferred future that would then be worked towards.

However, despite the political commitment to the ensemble and the administrative steps taken, the revitalization of the buildings has not become a reality (Figure 2). Only building A has been fully renovated (in 2021) and is rented and used by the city. Building C was purchased by a private investor in 2015, but renovation work has not been completed. It turned out that times were too uncertain to determine a future. When the chosen future did not materialize, the function of scenario-planning changed, as will become clear below.

2 Stadt Halle (Salle), VI/2015/01130, Grundsatzbeschluss zum Erhalt des Scheibenensembles im Zentrum des Stadtteils Neustadt, 20.08.2015. See pp. 5–6.

Figure 2: The Hochhausscheiben A, B, and C in the centre of Halle-Neustadt, 2016.

Source: Hühne, Geschichtswerkstatt Halle-Neustadt.

Since its adoption, the 2015 resolution has been repeatedly referred to in statements, plans, and brochures, as this political decision has subsequently guided administrative work. In a 2019 workshop, the planning team developed internal scenarios for the buildings, once again outlining three familiar options: 'renovation', 'vacancy and conservation', and 'demolition and new construction' (internal table, 2019). This time, consistency with the objective of preserving the buildings was included as an evaluation criterion: In the created evaluation table, '+' indicated coherence with the objectives, '0' meant no direct effect, and '–' meant direct contradiction (internal document, 2019). However, the planning team outlined more or less the same options. In the end, the practice of scenario-building seemed to be an integral part of planning routines – especially in addressing the contingency and the uncertainties of the present – rather than merely serving as a tool for developing a strategy. When it came time to summarize the results of the workshop, one planner was given the 2015 scenario tables and asked to make minor adjustments. Scenario-building turns out to be a repetitive re-enactment of past futures, ensuring administrative continuity. Indeed, what I observed is consistent with a commonly cited paradox of planning, which suggests that planning often pushes the fu-

ture further away while responding more to the past than the future (Abram and Weszkalnys, 2013; Färber, 2019; Farías, 2020; Valverde, 2011). This repetition, I argue, sustains the multiplicity of possible futures but also contributes to the persistence – and vacancy – of the buildings.

When asked about the role of scenario-building, one planner remarked: 'We have everything ready; we are prepared for any eventuality' (field notes, 18 August 2020) – a sentiment shared by colleagues who viewed development as beyond their control but believed they could adapt to any changes (group discussion, 14 April 2021). Here, scenario-building is less about fixing a future than about conceptualizing 'the possibilities that time offers space' (Abram and Weszkalnys, 2013: 2). Planners understand their role as managing change, not making it, as they operate within a city shaped by market forces and the dynamic 'interplay of economy, technology, society and politics' (Schubert, 2015: 145) that can only be indirectly influenced through planning regulations (Farías, 2020: 177). Embracing uncertainty and complexity, they see flexibility as a practical response to the future (Pizzo, 2015: 136).

Navigating: Acting on distant and near futures

This section explores how planners have navigated between long-term visions and short-term measures when translating strategies for the revitalization of Halle-Neustadt's centre into action. The focus is on how different futures – both near and far – become related in planning and how my interlocutors navigate through and along these futures.

I am referring here to the implementation of the 'Neustadt Centre Structural Concept' (Strukturkonzept Zentrum Neustadt), which was developed by a Berlin architecture firm for the city of Halle. In April 2019, the city council adopted this concept as a concretization of the redevelopment goals for the area, which includes the high-rise buildings and their immediate surroundings. The concept aims to give concrete ideas and form to the redevelopment objectives and provides guidance, but is not binding, thus requiring planners to balance long-term visions with short-term measures. For example, I assisted to discussions on redesigning the entrance area of building A, where it was important to ensure that changes did not compromise the long-term goals for revitalizing the area as a whole, including the high-rises. Conversely, long-term ideals can sometimes stifle progress if their objectives prove unattainable. The achievability of these objectives and the feasibility

of their implementation depend on a 'future present' that is only partially predictable. This is particularly true when private actors are involved in the implementation process (field notes, 1 March 2021, 4 March 2021). Navigating these temporalities and the contingency of the future becomes a matter of keeping scenarios open and preventing immediate actions from blocking the path to extended visions.

The 'Neustadt Centre Structural Concept' contains broad visions, such as adaptation to climate change, as well as variants and proposals, which the planners divide into long-term and short-term measures (field notes, 5 May 2021). The overarching objectives involve preserving the architectural ensemble, revitalizing the high-rises through repair, and carrying out energy-efficient refurbishments and climate adaptation measures. In a presentation I attended in 2018, the architects emphasized a phased approach to implementation, outlining a long-term strategy with several options for upgrading the pedestrian passages around the high-rises (field notes, 22 November 2018). By 2021, planners were translating these strategic visions into actionable steps. Together with their colleagues from the departments of green space maintenance and traffic planning (Grünflächenpflege und Verkehrsplanung), they defined time frames, designated different zones, and prioritized actions while working on several fronts simultaneously (field notes, 8 April 2021, 7 June 2021).

Within the planning department, there was disagreement on whether to prioritize incremental steps or focus on the bigger picture, particularly in relation to the reorganization of parking and traffic. According to the concept, optimizing parking is crucial for revitalization and adapting to the needs of future users (Schönborn Schmitz Architekten, 2018: 6). Consequently, public funds were earmarked for the demolition of underused car parks cluttering the spaces between the Hochhausscheiben, and negotiations with reluctant owners were to be intensified. If an agreement could be reached, the funds would be prioritized for these larger projects, as this step was considered essential. Failure to agree could jeopardize key projects and reduce or negate the impact of smaller actions. Both approaches – starting with big goals or focusing on smaller steps – carry risks. Starting with ambitious goals is consistent with the overall vision but may falter if intermediate steps fail. Conversely, prioritizing immediate actions risks losing sight of broader goals (field notes, 8 April 2021). The planners underscored that coordinating short-term and long-term actions is linked to credibility, and that only visible changes can signal the city's commitment to its long-term vision (field notes, 18 June 2019).

In practice, these temporally different futures are intertwined in intriguing ways. Distant futures often seem elusive or unattainable, making short-term measures a vehicle of hope – steps that might, for instance, eventually enable the revitalization of the high-rises. As another example, parking reorganization is seen as a necessary step to attract investment by making the area more attractive, ideally leading to future revitalization. The challenge is to align these actions with a vision for the high-rises as active, inhabited spaces while also addressing current constraints.

Planners thus navigate between long-term visions and immediate actions, balancing the multiple temporalities involved in managing the site. The image of the planner as navigator began to take shape in planning theory in the late 1980s. Albrechts (2004: 750), drawing on John Forester and his own earlier work, argues that planners, as navigators, are called upon to actively shape the 'course' of change without misusing their power. Jean Hillier (2011: 25) draws on Michel Foucault's 'metaphor of ships and navigation (pilotage)', describing strategic planning as a journey marked by unforeseen risks and dangers that require constant course adjustments. Quoting Jacques Derrida, she suggests that there had been a 'need for development of a new, more flexible, form of strategic planning which "if there is to be one, must advance towards a future which is not known, which cannot be anticipated"' (Hillier, 2011: 25). Navigating previously unknown trajectories, according to Hillier, involves experimenting with strategies that prioritize flexibility and openness to emerging possibilities (ibid.: 27).

Planners as navigators self-identify as 'managers of change' – a change primarily driven by private investment (Schubert, 2015: 145; Farías, 2020: 177). Such planning, according to Hillier (2011: 25), would be more concerned about trajectories than about outcomes; it becomes a site of experimentation. Planners navigate between long-term and short-term 'planes', a term that Hillier (2011: 27) takes from Gilles Deleuze and Félix Guattari. Whereas long-term strategic plans and trajectories contain 'multiplicities of ideas, many of which never come to actualization', short-term planning, such as '[l]ocal area action plans, design briefs, detailed projects […] tend to be relatively local or micro-scale […], and content specific'. According to Hillier (ibid.), such plans resonate with Deleuze and Guattari's 'planes of organization' and 'facilitate small movements or changes along the dynamic, open trajectories of planes of immanence'. These two planes of planning on which planners act simultaneously are interwoven and are knit together sometimes more harmoniously, sometimes rather loosely. While planners navigate processes

that are largely shaped by factors beyond their direct control, such as private investment, they do not simply navigate towards clearly defined goals and 'function smoothly as neutral means to given (and presumably well-defined) ends' (Albrechts, 2004: 750), nor do they simply wait for externally driven change. Of course, they have guiding principles that naturally change over time (Abram, 2017: 76). This is evident in the evolving vision for Neustadt's centre, a centre which now stands in sharp contrast to its original modernist conception. The contemporary vision, as articulated by the architect whom I had the opportunity to interview, prioritizes 'buildings shaping space', in the tradition of European cities, as opposed to the modernist ideal of 'buildings in flowing space' (field notes, 27 November 2018). In committee discussions on the concept, the central goals for the centre of Neustadt include activating the high-rises and tackling what is referred to as an 'enormous urban planning deficiency'. The aim is to create a spatially defined public space, similar to *Wilhelmian-style* neighbourhoods (committee meeting, 22 November 2018). City planners have drawn inspiration from books, the historic centre of Halle, and other European cities in order to move away from modernist paradigms and towards 'human-scaled' public spaces (field notes, 4 May 2021). These efforts reflect what Simone Abram identifies as different forms of the future: abstract visions 'around which to articulate hopes and fears for collective life, for ideals […] and moral standpoints', as well as comments 'on the world as it is today, and how we would prefer that it was' (Abram, 2017: 73). Abram stresses the need for pragmatic connections between abstract visions and concrete actions because without such connections, long-term plans and guiding principles risk becoming 'just words' (Abram, 2014: 130).

In Halle, the realization of the different steps of the redevelopment concept depends on the willingness of private owners to cooperate, thus the future is highly uncertain. Facing uncertainty, planners act on different short-term futures at the same time, all while trying to keep the extended vision alive. In order to cope with the plans and related promises made in public-private negotiations, and with the need to respect budgetary constraints, planners often face dilemmas that reshape or even dissolve original plans. This is consistent with Laura Bear's description of dissolved plans and the changing roles of bureaucrats in the speculative city (Bear, 2013). As the deputy mayor of Halle noted, the final outcome is unlikely to be fully in line with the concept, but these plans provide an essential starting point for dialogue and further development (interview, 28 May 2021). Planners are aware that the path to the future emerges 'as a dialogue between people's attempts to plan and shape futures and contin-

gent events beyond their control' (Alexander and Sanchez, 2018: 5). Despite acknowledging that some visions may not be realized within the 15-year planning horizon, the planners in Halle see long-term planning as a means of ensuring continuity across electoral cycles (field notes, 8 April 2021, 27 May 2021). However, doubts persist about the value of formulating long-term goals when immediate obstacles – such as owner resistance – make them unattainable (field notes, 25 January 2023). The city's planners are often frustrated and sometimes question the value of long-term goals in the face of weak negotiating positions, limited investment prospects, and failure to take even the smallest steps.

My interlocutors often oscillate between the overarching concept and its translation into practical action. They are used to thinking in terms of spatial and temporal modules that allow them to adapt to changing circumstances. Laws and regulations aim to provide structure and strengthen the position of planners and municipalities, but planners fear that overly rigid frameworks could hinder rather than facilitate the future (field notes, 28 June 2021). The challenge is to find the right balance between structure and flexibility to ensure that planning remains a useful tool for shaping desirable futures.

Producing indeterminacy: The present as a space of potentiality

As discussed in the previous section, the planners in Halle have oscillated between near and distant futures, maintaining the long-term vision of redeveloping the centre of Neustadt and revitalizing the Hochhausscheiben while adapting to emerging (im)possibilities. The challenge is not only to strike this balance but also to effectively communicate the vision to a wider audience, convincing them to get involved in co-creating the future. In 2021, the city of Halle produced a brochure based on the 'Neustadt Centre Structural Concept' to showcase Neustadt's potential, particularly to investors and the public. This effort illustrates a key move in future-making in a mode of standby: the production of indeterminacy. As I will now show, the production of indeterminacy is the result of the uncertain and open future in the present and an integral part of planners' efforts to promote co-creation.

I draw on Ringel's study of Bremerhaven's urban infrastructure transformation, which highlights moments when the present has been re-evaluated and expectations for the future recalibrated, involving the production of indeterminacy (Ringel, 2018: 69). For example, Columbusstraße, the city's main street, lost its function and value after deindustrialization, being considered

even a 'material obstacle to the city's future' (ibid.: 75) and a failure of 1970s urban planning. Later, urban planning reconsidered Columbusstraße's potential for new connections, revaluing Columbusstraße. In this moment of revaluation, as Ringel argues, planners rendered the street's existence indeterminate by 'referring its contemporary existence to the past while excluding its present from the future' (ibid.). With the example of Columbusstraße, Ringel shows that indeterminacy is not inherent to the future but is actively produced in the 'moment of (temporal) revaluation' (ibid.: 74). Ringel suggests that when dismissed infrastructures are reinvented, 'ideas of the future already roam the present' (ibid.: 86). Taking Ringel's argument to Halle, I suggest that the city's 2021 brochure renders the centre of Neustadt and the high-rises indeterminate. It does so through temporal narratives that emphasize the distant past and the future while overlooking the immediate past and the present, and through messages and a visual language that highlight the architectural neutrality, flexibility, and potentiality of the site.

First, the brochure emphasizes the historical significance of the Hochhausscheiben while downplaying their more recent past, often framed as a period of decline. By focusing on their origins, it disconnects the present from the immediate past, creating space for new possibilities. In doing so, it activates the present as a space of potentiality by pointing toward an imminent future, reflected in the brochure's subtitle, 'Impulses from the Centre', and its objective to 'give an impetus' (interview with the architect, 27 November 2018). The renovation of high-rise A is presented as evidence that change is underway (City of Halle, 2021: 6). Shortly before the editorial deadline, one planner hastily took photos of the newly completed façade. It had been agreed that the photo needed to be taken in good weather – to produce an image that conveyed optimism and suggested that the future had already begun. Although it took several more days for the weather to improve, the planner chose to wait rather than digitally enhance the existing image. Earlier photos had already been taken, but in them, a construction crane was still in place, and building A remained covered with tarpaulins. The longer the brochure's finalization was delayed, the more likely it became that the placeholder photo could be replaced with a photo showing the completed building under clear skies (field notes, 12 April 2021, 12 May 2021, 17 May 2021).

In 2021, the city's alderman expressed optimism, anticipating that a future for all five high-rise buildings would be defined within 3 years (interview, 28 May 2021). Meanwhile, convincing other stakeholders of this potential remains central to the concept and the brochure. Similar to Bremerhaven, the build-

ings' temporal existence has been deliberately destabilized; the recent past is erased to emphasize future potential, aligning with Catherine Alexander and Andrew Sanchez's notion of indeterminacy as 'an imaginary state that provides the precondition for certain value-creating interventions' (Alexander and Sanchez, 2018: 2).

Second, the brochure repositions the high-rises as flexible structures capable of diverse future uses. Visualizations from commissioned studies demonstrate adaptability and transformative potential and frame the high-rises as objects awaiting reinterpretation. The city planners argue that developing and visualizing possibilities facilitates conversations about transforming the area and the buildings. The feasibility of renovation often depends on perceived suitability for various uses and the capacity to support diverse future needs. Indeterminacy, evoked through images and ideas, becomes a central strategy in this process. An open future – defined by adaptability – emerges as critical in navigating the uncertainties of urban redevelopment and the future's contingency. Structures that can easily adapt to contemporary needs lower construction costs, increase profitability, and appeal to prospective tenants. Consequently, the flexibility of the structures has been a recurring and contentious topic among planners and architects. As early as 2002, for example, a group of architects developing a redevelopment concept for Halle-Neustadt's centre described the structure of the Hochhausscheiben as follows: 'If it is stripped down and cleaned, skeletonized, so to speak, the naked structure of the stacked levels remains; it remains usable cubature. It is existing capital that merely needs to be reinterpreted. The functionally neutral structure allows for various possible uses' (ARGE Architektur und Planung, 2002, preamble to part 4 of the concept).

Visual imagery is not merely illustrative but strategic, helping to demonstrate the potentiality of the Hochhausscheiben. Reflecting on this, the city's alderman shared: 'I've also noticed that they [investors] can't imagine some things, but after conversations, examples, and trying it out, there's this kind of "aha effect"' (interview, 28 May 2021). In 2014, for example, representatives from the state's Competence Centre for Urban Redevelopment used visualizations from an international urban design workshop on Halle-Neustadt when attending real estate fairs to attract potential buyers for the Hochhausscheiben. The professor leading the student workshop told me that, unlike the eastern German participants, the international students focused solely on the buildings' solid structural condition – they were not influenced by the negative image of prefabricated housing estates in Germany. They identified

the main issue as the absence of people, rather than any inherent flaw in the architecture. As the professor explained, the workshop aimed to demonstrate precisely this point – that the buildings could indeed be revitalized. And in the professor's view, the students had succeeded in proving that conversion was indeed possible (interview, 27 November 2018). These visualizations simplified the complexity of the buildings by focusing on their structural framework to emphasize flexibility. This process, as I interpret it, generates indeterminacy. While the preservation of the high-rises has been defined as a political goal, the city administration stresses that the future's form remains open. Similarly, the architects commissioned for the Structural Concept in 2018 used black-and-white renderings, depicting the buildings and their surroundings as neutral volumes functioning as vessels, emphasizing adaptability over specificity.

However, the approach and strategy of the city and state – to develop concepts and visualizations that show the high-rises as neutral cubes that convey the message of a place 'where any dream can be realized' – has caused scepticism among the citizens of Halle. They have perceived a persistent gap between vision and reality. Public frustration culminated in 2014 during forums where participants criticized the steps taken by the city as a superficial tactic to buy time, accusing the administration of 'doing something without doing anything' (Halle Spektrum, 12 February 2014). Over the years, the primary role of the concepts has been to draw attention to the buildings and to create spaces of possibility, thus acting as a 'device of interessement' intended to generate publics and enable the 'enrolment' of investors (Callon, 1984: 211). In addition, as I understood it, the commissioning of concepts was simply one of the things that could be done. Unfortunately, this has not led to any visible development of the buildings for many years.

As Dawdy (2010: 772) points out, modern ruins are 'continually re-created out of a conjunction of imagination and materiality'. The same can be said of standby, which operates as a configuration that stabilizes the potentiality of the future. The hope for future development ties the city administration to the buildings in the form of a promise that is non-binding but rather an 'organising agencement [assemblage] that is only somewhat monitored. This almost uncontrollable presence in absence (or virtuality) of the promise attunes the time-space in a perhaps reliably loose way – and demands endurance to keep it staying' (Färber 2019: 267). To keep the future open, the city engages in maintaining (the potentiality of) standby. One fundamental condition of standby is the anticipation of an 'on' – or at least the possibility of a future decision.

For the city of Halle and its planners, the production of indeterminacy is a way of embracing contingency and uncertainty with the overarching aim of securing a future for the Hochhausscheiben ensemble. This involves deliberately blurring the material characteristics of the structures to emphasize their adaptability and openness to new uses. The aim is to preserve not only through conservation, but also through adaptive transformation in collaboration with private partners. Ultimately, by producing indeterminacy, the planners seek to keep the present flexible, ready to pivot towards a range of future possibilities. The present state of the buildings is thus framed as a moment of potential rather than finality. By rendering the present indeterminate, Halle's city planners hope to mobilize both public and private actors towards a shared vision of the future, one that remains open and full of promise.

Conclusion

The case of the Hochhausscheiben in Halle-Neustadt sheds light on future-making in a standby mode. After 1989/90, these high-rises became symbols of uncertainty, characterized by decay, speculation, and a lack of clear future prospects. Unlike interim spaces in the cities of Copenhagen or Bremerhaven that await gentrification (Ringel, 2020; Lapiņa, 2021), the Hochhausscheiben exist as objects without a market for them. As one city planner said: 'The problem is that I have a product that is simply not in demand – too bad!' (interview, 2 October 2018). However, these buildings invite the (re)making of futures without prescribing their form or time frame. The standby mode thus appears as a socio-material form of engaging with uncertainty and contingency.

This chapter partially challenges Lisa Baraitser's as well as Kemmer, Kühn, Otto, and Weber's framing of standby as a durational power and coping mechanism in times of crises (Kemmer et al., 2021). While their perspective highlights standby's role in enabling persistence, the findings from Halle reveal its function as a strategy for sustaining futurity. Here, standby is not just about persistence or claiming more equitable futures but about maintaining the openness of the future. It reflects the impossibility of determining futures in the present and goes beyond merely coping with contingency – it embodies a form of waiting that anticipates private investment while balancing a lack of agency, possibility, and uncertainty. This dynamic points to a temporal agency that ensures the future remains accessible yet undefined.

Throughout the sections of this chapter, we have come across different practices of making the future and the different forms the future takes within these practices. As I have shown, scenario-building, initially a tool for political decision-making on preservation, has evolved into a framework for preparedness while navigating unpredictability. The role of scenario-building thus changed with the growing uncertainty over whether preservation of the Hochhausscheiben could actually be achieved. Today, it allows planners to have a sense of being able to respond to and be prepared for all eventualities. This aligns with a shift in urban planning described in the literature, where uncertainty is no longer an obstacle but a generative condition. The other practices of future-making – navigating short- and long-term futures and producing indeterminacy – also refer to the presence of the uncertain future as it is in a standby present. Standby forces planners to constantly negotiate temporal horizons, preserving the potentiality of the present while holding space for futures yet to be made. This strategic indeterminacy allows planners to remain ready for action, ensuring that even in periods of inactivity, the possibility of reactivation and revitalization endures.

This chapter argues that standby, as a mode of post-industrial and post-socialist being, offers a distinctive way of engaging with the future – a continuous process of future-un/making, in which uncertainty and possibility coexist. Planners' efforts reflect both the exhaustion and resilience needed to sustain urban futures shaped by hope and precarity. Navigating stasis and change, they cultivate an openness to multiple potentialities rather than pursuing a fixed trajectory. Standby thus emerges not as passive state but as a productive force – resisting closure while preserving the potential for transformation, embodying the unique space-time entanglements of post-industrial and post-socialist spaces. Standby affects those seeking futures for vacant buildings. It is '*not energetically neutral*' (Wiedemann, 2021: 44; emphasis in original), as it demands money, emotion, and work to maintain the buildings' availability and potential. In eastern German municipalities anticipating renewed vacancy, urban strategies institutionalize standby: Some buildings are designated as 'observation properties' and placed in a state of minimal maintenance (Röding et al., 2017). Standby, here, emerges both as a symptom and a strategy of negotiating the uncertain futures of the built environment.

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12. Producing (urban) contingencies
Infrastructural interrelations in Hamburg

Lena Enne

Introduction

Contingency lies at the heart of infrastructural configurations such as Hamburg's gas, water, and sanitation systems. On the one hand, supply networks are designed not only to provide urban societies with water and energy but also to prepare those societies for unexpected events. In Hamburg, for example, the introduction of a networked water supply in the 1840s delivered drinking water to citizens and industry while also ensuring a sufficient supply of water for the fire brigade to respond to potential fires. Similarly, the concurrent construction of a sanitation system helped prevent disease and – being a mixed system – was also intended to drain stormwater away from the densely populated inner city, thus preventing floods during heavy rainfall. On the other hand, and on a more abstract level, infrastructures are themselves highly contingent configurations. Urban infrastructures in cities of the Global North have often been viewed as distinct objects following a clear, linear path of development aligned with the modernist ideal of continuous technological progress. More recent understandings, however, following the 'infrastructural turn' (Amin, 2014; Coutard and Rutherford, 2016) in the social sciences, emphasize the relational and processual nature of urban infrastructures. These newer approaches reject teleological conceptualizations and instead foreground the historical and geographical situatedness of infrastructural development. Within this framework, infrastructures are seen as contingent configurations where different materialities and temporalities intersect, forming what scholars call *infrastructural palimpsests* where the new does not simply replace the old but where temporal, material, and cultural aspects are

layered on top of each other, producing unforeseeable relational processes (Graham and Thrift, 2007; Moss, 2020).

Building on this image of the palimpsest, this chapter traces the contingent nature of infrastructures by researching Hamburg's gas, water, and sanitation networks. It explores different dimensions of infrastructural interrelation based on two examples of a particular infrastructural form: the supply tunnel, in which various underground supply infrastructures are bundled within a single accessible conduit. One example was executed as an experimental project on a street in Hamburg's inner city in 1892; the other was a planned but ultimately unrealized component of the current large-scale inner-city development 'Grasbrook', a new urban quarter now under construction. Through the discussion of these two cases, this input demonstrates how different infrastructure sectors relate to each other and to broader urban processes. Using research on maintenance and repair practices as an empirical and analytical entry point, the chapter reveals how a historically informed examination of infrastructures uncovers the interdependencies among different sectors as well as their evolution over time. It also shows how infrastructures are deeply embedded within broader urban dynamics, generating various forms of contingency and necessitating efforts to govern them. Understanding these processes is central to questions of urban future-making as it helps urban professionals to navigate and anticipate complex uncertainties in times of mounting socio-ecological crises.

The chapter is organized into three parts: Following a brief introduction covering conceptual foundations, research gaps, and methods, it presents the historical and contemporary cases of the supply tunnel, tracing the specific contexts from which each emerged. It then analyses the different dimensions of infrastructural interrelations that arise from these examples – namely spatial, temporal, and institutional entanglements – and examines the resulting practices of cross-sectoral organization, coordination, and cooperation. In doing so, this chapter shows how contingency not only emerges from specific historical contexts but is also produced by the entanglement and interrelation of different infrastructure sectors and how utility services try to manage these contingencies.

By exemplifying the contingent nature of infrastructure through examining Hamburg's gas, water, and sanitation systems, this chapter contributes to infrastructure and urban research in three ways. First, it advances the theorization of infrastructures as processual rather than as fixed, distinct entities, challenging narratives of linear and progressive development. Instead, it il-

lustrates how (dis)continuities within infrastructural development and complex interdependencies, such as the ones outlined here, can only be understood in light of the specific historical, spatial, and socio-political contexts in which they emerge and play out. Second, it offers a methodological contribution, highlighting the importance of historical analysis in urban research for understanding the contingent character both of infrastructures and of cities more broadly. Third, it contributes to the emerging but still under-researched field of cross-sectoral analysis in infrastructure studies. Although the significance of cross-sectoral approaches has been acknowledged in theory, empirical studies that examine multiple sectors together remain rare.

Researching the infrastructural nexus

While most infrastructure studies have historically focused on a single sector, contemporary approaches increasingly emphasize the importance of examining the interconnected nature of different infrastructural configurations (Monstadt and Coutard, 2019), a perspective traceable to early social studies of infrastructure. Susan Star, for example, in her ethnography of infrastructures, highlights 'embeddedness' as a defining feature of infrastructure. She argues that infrastructure is 'sunk into and inside of other structures, social arrangements, and technologies' (Star, 1999: 381) and that it 'does not grow de novo; it wrestles with the inertia of the installed base and inherits strengths and limitations from that base' (ibid.: 382).

Today, a key concept in the study of multiple infrastructure sectors is *nexus thinking*. It emerged during the last two decades as a framework for describing and understanding interconnections primarily between the water, energy, and sometimes food sectors (Monstadt and Coutard, 2019). Concerned mainly with identifying synergies and minimizing tensions between the sectors and aimed at informing management and policy-making, this concept has been criticized for its overly techno-positivist orientation. By prioritizing efficiency measures, nexus thinking often overlooks the complex socio-material interdependencies that extend beyond resource optimization and fails to account for urban space as the key arena where these interrelations as contingent processes unfold (Williams et al., 2014). Instead of embracing contingency, traditional nexus thinking seems to negate highly complex infrastructural interrelations, reducing them to mere input-output calculations.

While engineering research has long focused on the interdependencies of large-scale infrastructures, often conceptualizing them as 'systems of systems' (Eusgeld et al., 2011), within the social sciences this subject remains both empirically and conceptually underexplored. On a smaller spatial and temporal scale, however, there is a growing interest in studying multiple infrastructures within a single research framework, as exemplified by the 2019 special issue of *Urban Studies* on interfacing infrastructures. In their introduction, editors Jochen Monstadt and Olivier Coutard highlight the relevance of this approach, arguing that urban infrastructures today exhibit 'an increasingly "nested" character with interacting resource flows, technological interconnections, operational and financial interdependencies, and manifold governance interfaces at multiple scales' (Monstadt and Coutard, 2019: 2192). These characterizations resonate with Stephen Graham and Nigel Thrift's (2007) conceptualization of infrastructures as palimpsests – a concept that captures the multilayered nature of individual supply infrastructures and enables an analysis of the temporal and material entanglements within and between multiple infrastructural systems. Tim Moss (2020) has demonstrated this approach in his historical study of five infrastructure sectors in Berlin, which, despite the relevance of an integrated approach, remains one of the few comprehensive cross-sectoral analyses spanning a broad timescale of 100 years. What seems missing however, is the question of how infrastructural professionals engage with the contingencies that emerge from the temporal and material multilayeredness of different infrastructure sectors.[1]

In order to understand how infrastructural contingencies emerge from specific historic, spatial, and socio-political contexts, how they play out across different sectors, and how infrastructural professionals manage them, this chapter draws on a mixed-methods approach. It combines material derived from extensive archival research, from qualitative interviews with managing employees of Hamburg Gasnetz, Hamburg Wasser, and HafenCity Hamburg GmbH, and from short participant observations of and ad-hoc interviews with maintenance crews.

1 See Ian Scoones (2024) for an analysis on how infrastructure workers – which he calls 'reliability professionals' – manage uncertainty. He is, however, not focusing on a cross-sectoral perspective.

Failed experiments: Infrastructure supply tunnels in Hamburg

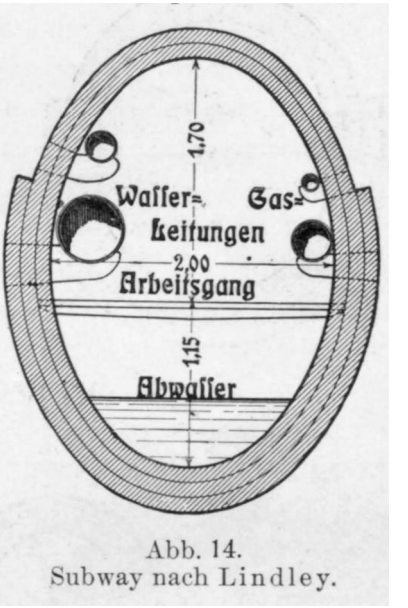
Supply tunnels, also known as utility tunnels or media channels, are accessible tunnels that carry various utility pipes, including sewage, water, electricity, district heating, and telecommunication cables. The main advantage of this infrastructure over traditional methods of burying pipes and cables beneath streets or footpaths is their accessibility for workers, allowing for inspection, maintenance, repair, or the installation of new infrastructure. Unlike the traditional approach, which requires digging up the street in the event of breakdown, supply tunnels enable easy access without construction work and its associated traffic disruptions. While some major cities, such as Prague, have extensive networks of these tunnels, most supply tunnels are constructed on a smaller scale in municipalities such as Jena or for specific needs, such as those of hospitals.

The following examples of supply tunnels from Hamburg are also small-scale interventions. In 1892, a tunnel was implemented as an experiment in a single street in Hamburg's inner city; over 100 years later in the 1910s, the revival of the idea of bundling different supply infrastructures within one accessible tunnel was framed as an 'infrastructural innovation' designed to serve a neighbourhood currently under construction. In the following sections, I will introduce both cases: the historical experiment and the resurgence of the idea in recent planning, focusing on the urban context and the discussions surrounding the planning and implementation of these supply tunnels.

The historical experiment in Kaiser-Wilhelm-Straße

Hamburg's infrastructural history is closely tied to the Great Fire of 1842, which destroyed much of the inner city and laid the foundation for the city's infrastructural development. In the aftermath, gas, water, and sanitation systems were planned and built from scratch, along with a new urban layout. A key figure in this reconstruction was the English engineer William Lindley, who drew on his knowledge of London's infrastructure as a reference for his plans for Hamburg (Schubert, 1997). Lindley also considered implementing subways in Hamburg – here, 'subway' in the sense of structures similar to supply tunnels that integrate various services into a single, oversized sewer-like system (Figure 1). However, due to high construction costs, he abandoned this idea and chose the traditional method of burying the pipes underground (Merckel, 1910).

Figure 1: Example of subway based on Lindley's proposal for Hamburg.



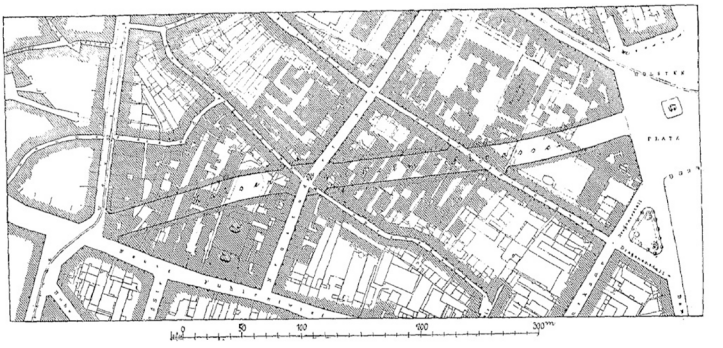
Source: Merckel, 1910: 13.

In 1890, the idea of bundling various supply infrastructures gained renewed traction through a talk by Berlin's building director, James Hobrecht, at a meeting of the Association of German Architects and Engineers in Hamburg. His lecture, titled 'The Modern Tasks of Metropolitan Road Construction with Regard to the Accommodation of Supply Networks', addressed the integration of utility networks into urban planning (Hobrecht, 1890). Hobrecht expressed concerns about the increasing density of underground infrastructures, which made it difficult to add new supply services and caused frequent traffic disruptions due to maintenance work. To address this issue, he proposed two solutions: first, creating a standardized street section with designated spaces for each supply service beneath the road; and second, constructing a single, accessible tunnel to contain all pipes and cables. This tunnel would not only organize the chaotic layout but also reduce the need for constant excavation and minimize ongoing traffic disruptions by allowing for direct repairs (ibid.).

Following Hobrecht's talk, the idea of the supply tunnel began to gain political momentum – although Hobrecht himself voiced scepticism regarding the feasibility of such constructions in Hamburg. Upon a request of the Bürgerschaft, a political entity within Hamburg's governance structure, it was ultimately decided to test the construction and operation of such a tunnel as an experimental project (Roeper, 1893), which, if successful, could result in further construction of such tunnels: 'If the currently proposed experiment with a utility tunnel yields particularly favourable results, the further construction of subways on suitable streets will not be ruled out.'[2]

The newly established Kaiser-Wilhelm-Straße in Hamburg's Neustadt was selected as the location for the experiment. This street was created through a so-called *Durchbruchsanierung* in the middle of the densely populated alley quarters (Figure 2). This type of urban redevelopment, primarily driven by private investors, involved the purchase of land and buildings which were subsequently demolished and reconstructed along newly built streets before being sold at a profit (Schubert, 1997). The construction of Kaiser-Wilhelm-Straße, however, was initiated and executed by the state due to a lack of interest from private investors (ibid.).

Figure 2: Planning of Kaiser-Wilhelm-Straße.



Source: Roeper, 1893: 18.

2 Mitteilung des Senats an die Bürgerschaft 1892, Staatsarchiv Hamburg, Abteilung Finanzdeputation I–III, Nr. 3222. All non-English quotations have been translated by the author.

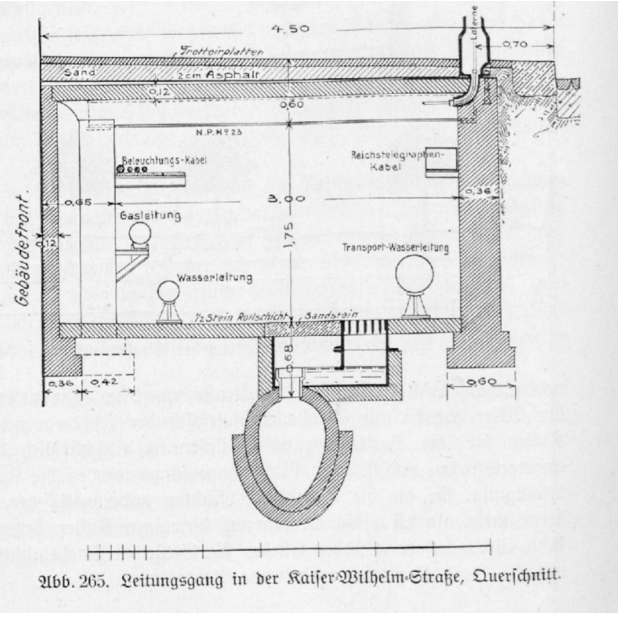
Major debates ensued regarding which infrastructures should be included in the tunnel. A particular point of contention was whether to incorporate gas, given its associated risks, a topic that was intensely discussed within the international engineering community. One engineer is even quoted as saying (in English): 'The day upon which these pipes are placed in the sewers, I shall not go into them without having made my will previously' (Hobrecht, 1890: 354). The initial proposal to build two tunnels – one on each side of the road, with one containing gas and the necessary ventilation and the other without – was ultimately dismissed due to financial constraints; instead, it was decided to test both versions in one tunnel, separated by a door (Roeper, 1893).

Construction began in 1892 with the tunnel being directly attached to the cellar walls of the adjacent buildings enabling the direct connection of households to the supply lines without the need for additional trenches (Architekten- und Ingenieursverein zu Hamburg, 1914). Ultimately, the tunnel spanned 450 metres in length, 3 metres in width, and 1.7 metres in height (Figure 3). Shortly after its completion, however, there was a consensus against constructing additional tunnels due to the 'exorbitant construction costs' (ibid.). But it was not only the high construction costs that were cited as an argument against further tunnel construction elsewhere in Hamburg. Particularly the accessibility for workers – a key argument put forth by proponents of the tunnel – was scrutinized from the outset, with concerns raised about the potential damage to the pipes by workers: 'Moreover, strict supervision is required for all workers operating within the utility tunnel to prevent any damage to the exposed pipes and cables, which are normally protected underground' (Roeper, 1893: 26). Evaluation during the tunnel's operation was also not favourable. An article from 1962 by the head of Hamburg's building authority, while acknowledging the decline in construction sites required to maintain the pipes and cables, expressed similar concerns regarding safety:

> It has been shown that even with a tunnel of this type, cross excavations to supply the neighbouring properties cannot be avoided. Additionally, many other disadvantages have emerged, primarily due to the varying characteristics of the different pipes (e.g. explosion risk, heat sensitivity of the cables). Furthermore, water pipe bursts can disrupt the operation of all pipes. For this reason, there are no plans in Hamburg for such structures again. (Willigerod, 1962)

The tunnel at Kaiser-Wilhelm-Straße was in operation until 2022, when the city decided to fill in most of the 450-metre-long structure, as renovating the still-functioning but structurally unsound facility would be too expensive. Only a small section was preserved for heritage protection purposes (Ulrich, 2022).

Figure 3: Section of the finished utility tunnel in Kaiser-Wilhelm-Straße.



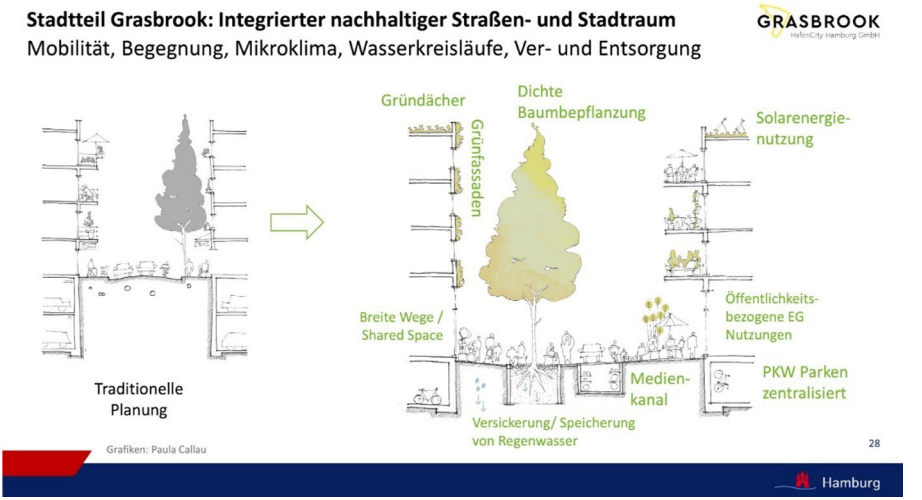
Source: Architekten- und Ingenieursverein zu Hamburg, 1914: 154.

Contemporary infrastructure planning at Grasbrook

The statement made by the head of Hamburg's building authority in the 1960s, that no such supply tunnel structures would be built in Hamburg again, held true until the planning of the Grasbrook project began in the 2010s. Grasbrook is a major urban development project in Hamburg, located along the southern banks of the Elbe River, facing the well-known HafenCity district. Both Grasbrook and HafenCity are inner-city developments that form part of Hamburg's

broader strategy to create new residential and commercial spaces while revitalizing former industrial areas originally belonging to the harbour. According to HafenCity Hamburg GmbH (HCH), the development company responsible for managing the overall planning and realization of these projects, Grasbrook is intended to be a model for sustainable urban living, with a focus on 'modern infrastructure, environmentally friendly designs, and mixed-use spaces' (HCH, n.d.).

Figure 4: 'Innovative' infrastructure planning at Grasbrook.



Source: Grasbrook Forum, 2 November 2020.

During the initial informational events held between 2019 and 2020, the concept of a *Medienkanal* (media channel) was introduced to the public as a key component of the project's infrastructure planning. The proposal aimed to centrally supply the new neighbourhood through a 2 km long tunnel, integrating water, wastewater, electricity, district heating, cooling, and potentially telecommunications. Although labelled a 'physical innovation',[3] this tunnel conveys the same function as the historical structure at Kaiser-Wilhelm-

3 Stadtwerkstatt Informationsveranstaltung, 18 September 2019, Hamburg.

Straße: combining different supply services within one accessible infrastructure building (Figure 4). Some of the arguments in favour of the media channel at Grasbrook mirror those discussed regarding the historical structure. Notably, accessibility for maintenance and repair, along with the potential reduction of future construction sites, was also a central consideration, similar to the discussions surrounding the planning of the historical tunnel.

In addition to the similar discussions regarding maintenance and reduced future construction work, the need for openness regarding future developments was a central argument for the implementation of a supply channel in Grasbrook, framing it as strategy for enhancing resource efficiency and fostering change and innovation, anticipating future uncertainties:

> Given the increasing pace of change and ever-shortening innovation cycles in all areas of technology and society, a permanent and barrier-free accessible media route within an infrastructure tunnel could be a logical step towards improvement. […] Such a development would also provide a locational advantage for the implementation of innovative technologies and the establishment of companies whose future needs remain uncertain. (HCH, 2022: 80)

This emphasis on sustainability and innovation as key arguments for the development of the media channel was reinforced by an employee at HCH responsible for infrastructure planning at Grasbrook. In an interview in spring 2024, he highlighted the efficient use of space by installing all utility grids within a single tunnel, rather than occupying the entire road cross-section with separate supply and disposal infrastructures (interview, 19 March 2024). By concentrating all the pipes and cables within one structure, more space would be available for maximizing root and rainwater retention areas. At the time of the interview, the tunnel was, as he explained, only a so-called preliminary project – a stage even earlier than a feasibility study. During this phase, the development company HCH invited various stakeholders to explore the potential for constructing such a tunnel at the Grasbrook development. These stakeholders included Hamburg's publicly owned water, wastewater, electricity, and district heating providers, as well as other municipal actors involved in the planning and construction of such systems. Within this preliminary phase, the team at HCH systematically gathered all available information on utility channels and compared it with other alternatives based on technical, economic, and ecological criteria in order to convince both the supply services and political

stakeholders to adopt the project. This evaluation, for example, weighed the higher construction costs of the tunnel against the potentially lower maintenance costs, hoping that the initial investment would be offset by reduced long-term expenses (ibid.).

Eventually, in summer 2024, the decision was made against the media channel, as the high construction costs could not be justified politically, especially during a time of budget constraints, as the HCH employee explained. However, that same interviewee noted that the process of evaluating different options highlighted the benefits of compact installation, which has now become the preferred approach, where infrastructures are installed closer together compared to the traditional method that utilizes the entire cross-section of the street (ibid.).

Cross-sectoral contingencies: Dimensions of infrastructural interrelations

The examination of the historical supply tunnel experiment on Kaiser-Wilhelm-Straße and the recent attempt to implement a similar structure within the Grasbrook development highlights the challenges arising from the interrelations between different infrastructure sectors, specifically the spatial organization of underground infrastructure, the coordination of maintenance needs, and the cooperation across sectors. In the following, I first demonstrate how the need for spatial organization of infrastructures is addressed and what opportunities and challenges arise from this organization. Second, I illustrate how the spatial proximity and varying material conditions of different infrastructures necessitate ongoing coordination between utility services. Lastly, I examine how institutional cooperation at various levels attempts to manage the contingencies emerging from these infrastructural interrelations.

Organizing networks underground: Spatial contingencies

One of the original motives for constructing a tunnel to spatially bundle the pipes and cables of different infrastructure services in the late 19th century was to better organize the limited underground space. As centralized infrastructure networks expanded throughout the city, this space became increasingly crowded with pipes, cables, and network equipment. This growing density posed challenges not only for construction but also for ongoing maintenance

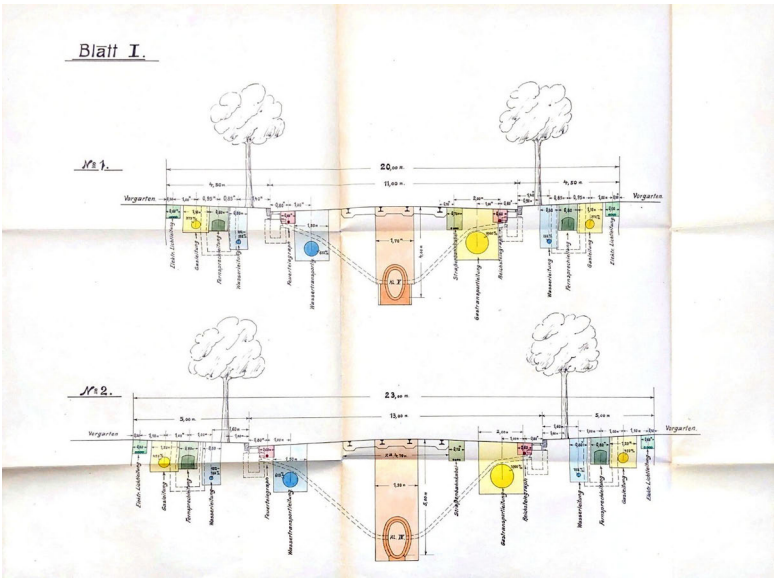
and repair. To accommodate the continuous increase in infrastructure density, efforts focused on organizing the spatial arrangement of pipes and cables directly when burying them underground. An unwritten rule generally guided the layout of utility services at the beginning of the 20th century: Sewage channels were typically placed in the centre of the road, while water pipes were laid on the right side and gas lines on the left, both positioned beneath the sidewalks (Stübben, 1907). However, this approach was not legally enforced; apparently, a rhyme was even in circulation that humorously critiqued the inconsistency in pipe placement, underscoring the gap between planning ideals and practice: 'Das Siel zuerst, das Wasser drauf, das Gas zuletzt – so hat es die Vernunft gesetzt / das Gas vorab, das Wasser dann, der Sielbau hinterher – so macht es häufig folgeschwer der Ingenieur!' (ibid.: 422).[4]

Not to rely on informal guidelines, Hamburg's utility services, in collaboration with the construction authority, addressed these issues by developing a standardized road section with dedicated pathways for each service. This process was initiated by the gas utility and is notably linked to the maintenance of their underground network. In a letter to the construction authority, the head of the gas utility complained that his workers struggled to access gas pipes due to new postal infrastructure laid directly above or near the gas lines. This complaint, made in July 1910, led to a series of meetings with representatives from the gas, water, and postal services, along with the building authority.[5] They were aimed at coordinating different supply infrastructures within the roadbed and eventually produced a scheme to regulate the exact depth and spatial arrangement of various pipes and cables (Figure 5). The final plan, approved in March 1911, still guides infrastructure work today and laid the groundwork for formulating standards and norms now applied nationally to facilitate not only the installation of pipes and cables but also their ongoing maintenance and repair.

4 An English gloss might roughly read: 'Sewers first, then water laid, and gas comes last – so reason's made / Gas before, then water's run, sewers built when all is done – Such careless order, fraught with woes, is how the engineer oft goes!'

5 Staatsarchiv Hamburg, 321–2 Ausarbeitung eines Schemas für die Anordnung der Leitungen im Straßenkörper 1910–1935, Nr. 1684.

Figure 5: Plan for the layout of pipelines in the street space, 1911.



Source: Staatsarchiv Hamburg (see footnote 5).

The routing plan has been in place for over a century, but the number of providers using street space to supply the city has steadily increased. This rise, particularly due to the rollout of new telecommunication infrastructure, has made it increasingly challenging for workers to access sewers, gas, and water pipes. An employee from Hamburg Wasser described the situation as follows:

> What has changed significantly in the last 100 years is the density of cables in the streets. We can hardly find any free routes. It's really crazy, the cable bundles we have to crawl through. We are one of the deeper ones at a depth of 1.5 metres. […] And all the new telecommunication companies just blindly throw their cables on top of ours. They obtain these excavation licences and route instructions, but nobody checks. […] Then, years later, when we need to access our pipes, we can't reach them because they didn't comply with the plan. So that's really … You have to look at it this way: The ground is full of rubbish. (Interview, 9 June 2023)[6]

6 All interviews were conducted in German and have been translated by the author.

The high density of pipes and cables beneath city streets results not only from the addition of new services but also from the retention of older pipes and sewers, which are often left in place after being decommissioned, further limiting available space. In some cases, these older structures are repurposed, creating a different kind of spatial infrastructure entanglement where old structures serve as conduits for newer utilities. For example, in 1998, Hamburger Gaswerke sold their decommissioned gas pipes to Deutsche Telecom.[7] Also in the 1990s, Hamburg Wasser founded servTEC, (Hamburg Wasser Service und Technik GmbH) a subsidiary that offers both active and decommissioned sewer networks for the installation of telecommunication cables (servTEC, 2023). This approach not only reduces the need for excavation but also facilitates easier access for inspection, maintenance, and repairs, much like a supply channel. Although the wastewater network's extensive reach and structure facilitate faster and more cost-effective installations compared to traditional methods, one of the engineers overseeing sewer construction and rehabilitation at Hamburg Wasser remains somewhat sceptical about this strategy:

> This is not my area of expertise, but my impression is that the euphoria we once had is waning again, due to the potential for disruption. For example, we had a case where someone was renovating our sewer, installed an inliner [a tightly fitting skin that is inserted into an old sewer to repair it], and forgot that the telecommunication cable was also there. Of course, that's a disaster. We always want to prevent too many people from handling our sewers. […] In this respect, we tend to say it's better to think about whether you can build in a confined space or find ways to facilitate joint construction. However, if it becomes too cramped, then you encounter the disadvantages again. (Interview, 30 June 2023)

The considerable density of infrastructure beneath Hamburg's streets continues to pose significant risks for the structures. Employees from both Hamburg Wasser and Gasnetz Hamburg have raised concerns that a major threat to their networks comes from other companies operating nearby. This often results in pipe breaks, either from direct force applied by excavators or pickaxes, or because the ageing pipe material cannot withstand excavation work and the resulting ground movement (fieldnotes, 8 February 2024; 18 April 2024). This risk

7 Geschäftsbericht Hamburger Gaswerke GmbH, 1998.

has been documented as early as 1855, when issues with the close spatial proximity of different supply infrastructures within the roadbed emerged. During this period, the gas company – then still privately owned – experienced frequent gas leaks caused by the expansion of the sewer system (Pens, 1937).

These examples illustrate how the finite space for underground networks necessitated a systematic spatial organization of various infrastructures. They demonstrate how the spatial proximity of infrastructures presents both opportunities and vulnerabilities for the networks which are not always predictable and have to be managed on various levels.

Coordinating maintenance rhythms: Temporal and material contingencies

The vulnerability of the networks, stemming from their close proximity, underscores a second aspect of infrastructural entanglements: the temporal and material interrelation of various infrastructure systems. The different sectors are linked not only spatially but also through the various materials that are part of their configurations and which pose different risks. These risks are associated with both the medium supplied by the pipes (gas, water, electricity, etc.) and the physical materiality of the structures themselves (steel, concrete, etc.), an interrelation that makes it hard to anticipate possible outcomes in case of dysfunction. For example, discussions regarding the inclusion of gas in the historical tunnel dominated considerations in the 1890s, whereas the evaluation of the tunnel in the 1960s assigned major risk potential to the possibility of water pipe bursts. Discussions about the new supply channel also focused on the material properties of the various mediums and the risks arising from their close installation. For example, a foreman at Hamburg Wasser expressed scepticism about the supply channel concept for Grasbrook. While he recognized that having all pipes accessible would facilitate maintenance and repairs, he was particularly concerned about the risk of a pipe burst potentially causing a short circuit that could disrupt all interconnected infrastructures. Similarly, another worker at Hamburg Wasser raised concerns about water quality. He noted that water pipes are typically installed at a specific depth to protect them from freezing in winter and overheating in summer. In a shared channel, he feared that temperatures would rise significantly, which could promote germ proliferation and negatively impact water quality and safety. Others highlighted concerns about the potential for corrosion due to condensation accumulating on the bare pipes (fieldnotes, 8 February 2024).

The material relations between different sectors extend beyond the cases of the supply tunnels. A notable example of such interrelation is the use of grey cast iron pipes, a historical type of piping produced during the 19th and early 20th centuries for the transmission of water and later gas. The advantages of grey cast iron included relatively low production costs and quick manufacturing. After World War II, these pipes became widely used in Hamburg for the reconstruction and expansion of the city's water and gas networks. However, it was later discovered that they were particularly vulnerable to breaking under external pressure due to their microstructure. This issue was identified as early as the late 1950s, leading Hamburg's gas and water supply companies to stop using grey cast iron pipes in favour of newly developed, more flexible pipes made from ductile cast iron, which is less prone to breakage. However, the gas and water networks, having both initially used the grey cast iron types of pipes before shifting to other materials, are now facing similar challenges: relatively new pipes installed in the 1950s that frequently fail. A worker from Hamburg Wasser noted that these grey cast iron pipes are among the worst in their network, breaking more easily than some pipes that are 150 years old (fieldnotes, 8 February 2024).

However, the strategies for addressing these material conditions differ from sector to sector, primarily due to the particular medium distributed and the resulting risk assessments. While the gas utility largely replaced its grey cast iron pipes with more durable materials by the early 2000s (interview, 13 June 2023), the water utility continues to struggle with frequent breakages of pipes from that era.

The problems with ongoing excavation work for maintenance and repair were also a central argument for constructing the historical tunnel in Kaiser-Wilhelm-Straße and played a key role in planning the Grasbrook tunnel. By providing easy access to pipes and cables within a shared structure, the tunnel would eliminate the need for continuous street excavations by various utility services, each operating on its own maintenance and repair schedule. Pipes and cables need to be repaired at different times, and maintenance rhythms vary between sectors. For instance, gas infrastructures require a more frequent and rigorous inspection cycle compared to water and sanitation networks. While a potential dysfunction in a water pipe may first be observed for a while, repairing gas pipes is more immediate (interview, 6 March 2024). The varying demands of infrastructure maintenance contribute to ongoing traffic disruptions, which have become a significant political issue in Hamburg. Through these disruptions, the usually invisible underground systems become visible

on a wider urban scale, turning the necessary construction work into a central topic within the city's political discourse (Drieschner, 2024).

Workers from gas and water services have expressed that they often face conflicting objectives in their maintenance and repair efforts where the importance of a functioning supply is undermined by other aims. In particular, the traffic regime, which prioritizes uninterrupted circulation, seems to create the most friction. A leading employee at Hamburg Wasser noted: 'In this city, the main issue is transport. Transport is prioritized over the provision of public services' (interview, 9 June 2023). Another employee acknowledged the unsolvable character of these conflicts: 'It is also understandable that there are, of course, conflicting political goals that cannot be resolved. I simply can't ensure that the traffic on the road runs perfectly and at the same time stand on top of it with my construction site. It's an unsolvable problem' (interview, 30 June 2023).

A major frustration of employees at Hamburg Wasser and Gasnetz Hamburg is that they have felt that public and political perceptions often overlook the efforts made to coordinate traffic management with the growing need for infrastructure maintenance and repair. According to them, enormous amounts of effort and time are being dedicated to coordinate these processes, whereas this effort seems not to be recognized at all (interview, 30 June 2023). One employee at Hamburg Wasser for example, highlighted the challenges of communicating the necessity of ongoing maintenance and the resulting construction work to the public: 'People only see that the road is being dug up, closed, and then dug up again six months later. They don't understand that different suppliers with varying needs are behind it' (interview, 9 June 2023).

In order to coordinate these conflicting objectives within Hamburg's infrastructure planning and operation, various tools have been developed. Apart from a coordination office (*Koordinierungsstelle*) located within the city's administration, whose role it is to oversee the construction applications of different supply services, there is also the cooperation project Hamburg Infracrew, through which public utility services (including traffic), city districts, and the port authority bundle their construction measures, coordinate their construction scheduling, including traffic concepts, and perform their services on a joint construction site (LSBG, n.d.-a). Another attempt to coordinate construction work more efficiently is an online tool called ROADS, which is used to coordinate not only the locations but also the timelines for various construction projects. The goal is to minimize the impact of these projects on traffic flow (LSBG, n.d.-b).

However, although the need for coordination resonates with gas and water utility workers at various levels, the workers all stress that it is not as straightforward in practice as in theory due to the diverging needs and regulations of different sectors. The physical proximity of different networks does not automatically translate into common temporalities concerning maintenance and repair. Aimed at being based on objective decision-making, the coordination of infrastructural maintenance and repair is a continuous negotiation process between different needs and goals. The supply of fresh water and gas, as well as sanitation, stands in direct competition with the smooth flow of traffic and the expansion of public transport and bike routes. Additionally, more than just the gas, water, and sanitation sectors are involved. Coordination must consider not only the diverse needs of all supply and transportation infrastructures but also the varying organizational and ownership structures behind each project, along with different types of urgencies based on material needs and political prioritization, creating a complex web of interrelations.

Cooperating across networks: Institutional contingencies

The different infrastructural sectors are related not only spatially underground and temporally by their maintenance and repair rhythms but also on an organizational level. Examining both the historical and present-day utility tunnels reveals the needs, possibilities, and limits for cooperation between the city and different sectors. The historical tunnel was a state-led experiment implemented in the broader context of an also state-led urban renewal project. Similarly, the idea for the present-day tunnel was initiated by a state-owned company that planned to execute the tunnel within its own large-scale urban development project. Although in both cases most of the included infrastructure sectors were state-owned companies, questions regarding the distribution of responsibility and the limits of the state's agency arise.

A central concern in the discussion on utility tunnels is whether the operator of the tunnel can compel privately owned service providers to install their pipes and cables within the tunnel. In his above-cited lecture on utility tunnels in 1890, Hobrecht explained the procedure in the city of London, which mandated utility services to install their pipes within such tunnels:

> After some initially unsuccessful attempts, a law was finally enacted: the Metropolitan Subway Act of 1868. […] Under this law, gas, water, and telegraph companies were required to lay their pipes in these subways. A fine

> of 20 pounds was imposed for each instance where the pavement was later broken open there. If pipes that had already been laid in the road embankments were relocated to the subways, this was done at the expense of the Board, which was also responsible for maintaining the ventilation and structural integrity of the subways. The individual lines within the subways were to be maintained by the respective companies under the supervision of an official of the Board. (Hobrecht, 1890: 355)

In Hamburg, more than 100 years later, similar concerns emerged regarding the Grasbrook tunnel. An employee of HCH noted that while the state-owned utilities designated to supply Grasbrook (water, electricity, and district heating) have been included in the planning process, there is no established legal framework to compel privately owned services, such as telecommunications, to install their cables and pipes within such a channel (interview, 19 March 2024).

Another significant obstacle, despite the involvement of primarily state-owned supply services in both cases, was the absence of a unified public institution (*Stadtwerke*) to coordinate the implementation and manage the operation of the tunnel. Hobrecht himself highlighted at the conclusion of his lecture that it is crucial to collectively organize the various supply networks: 'In large cities, it finally seems essential that the management of various utility services, at least as far as the supply networks are concerned, is consolidated under a single technical authority' (ibid.: 387). The lack of such an authority and the resulting unresolved questions regarding the operation of the Grasbrook tunnel have emerged as a key obstacle to its implementation (interview, 19 March 2024). Aside from questions regarding the organization of cross-sectoral projects, the main concern about the operation of utility tunnels revolves around the assignment of responsibilities. One worker at Hamburg Wasser expressed concern about the utility tunnel at Grasbrook: 'It's nice that we can potentially go there and fix a pipe or so. But that also means the workers of the other services can go there. And if something happens, who is responsible?' (fieldnotes, 8 February 2024).

Questions of responsibility also extend beyond the context of these tunnels. The close proximity of underground networks often results in accidental damage to other pipes during maintenance and repair operations. During my time with the maintenance crew from Gasnetz Hamburg, they responded to a report of 'coating damage' made by a private construction company. Coating damage refers to the harm done to the protective coating of a steel gas pipe, of-

ten caused by tools during trench digging. One of the workers, explained that, in the past, the company responsible for the damage was required to cover the repair costs. However, this practice was discontinued as it discouraged the reporting of such damages. Under the older system, instances of corrosion often went unnoticed for years, and the subsequent repairs for such corrosion proved to be significantly more expensive than the costs of immediate repairs on the gas network. Nowadays, more damage reports are submitted, yet repairs are also carried out more promptly (fieldnotes, 18 April 2024).

In general, coordination and cooperation among publicly owned companies tend to be more effective than between public and private entities. A managing employee from Hamburg Wasser explained that this is largely due to the ease of legal collaboration when both utilities are publicly owned. Since publicly owned utilities adhere to the same standards and follow similar procedures, coordination becomes much smoother (interview, 19 July 2023.). Additionally, state-owned providers exhibit a stronger sense of responsibility and continuity compared to younger, privately owned services, as one employee managing water grid operations stressed: 'We [the publicly owned service providers] also have conflicts over routing and so on, but it's a long-term approach. I think that's what it's all about. You always meet twice' (interview, 9 June 2023). Another employee echoed this sentiment, noting that communication and collaboration are significantly easier now that all suppliers are publicly owned, especially compared to the period when gas and electricity services were privatized: 'Even if it's just that you see people's phone numbers and can call them. The barrier is much lower, which is much better' (interview, 30 June 2023). This was not always the case, as most employees at Hamburg Wasser and Hamburg Gas recalled that cooperation between gas and water was very advanced before the privatization of the gas utility in the early 2000s. However, communication broke down when gas grid operations were outsourced during the privatization process. Today cooperation between the sectors is again back on the agenda. This cooperation extends, for example, also to practical levels: When supply lines cross waterways, they are mostly mounted to bridges. In these instances, Gasnetz Hamburg, which has the most frequent inspection cycles, takes over pipe inspections for other services (interview, 1 February 2024).

This increase in organization, coordination, and cooperation coincides with an ongoing trend of politically implemented mergers among various state-owned supply services in Hamburg. The sanitation authority *Hamburger Stadtentwässerung* (HSE) merged with the freshwater supply utility *Hamburg*

Wasser GmbH (HHW) three decades ago, in 1995, and the district heating and electricity services were consolidated into Hamburger Energiewerke GmbH following the remunicipalization of the district heating grid in 2019. Most recently, in 2024, the gas and electricity grids were merged to Hamburger Energienetze GmbH. As a result, two major supply entities have emerged: one focused on water supply and wastewater management, and the other dedicated to energy provision and distribution. This evolution suggests a movement towards a more unified structure, similar to an umbrella institution like the *Stadtwerke*.

These examples illustrate how the various infrastructure sectors in Hamburg are interconnected at an organizational level. This interdependence is highlighted by the necessity for collaboration due to spatial proximity, as well as the differing needs and responsibilities associated with maintaining and operating a grid within a broader system of grids. Communication and cooperation tend to function more effectively among state-owned services, and there appears to be a trend in Hamburg towards further integration of these services, as an institution with a comprehensive overview seems to be better equipped to manage the various contingencies that emerge from infrastructural interrelations.

Conclusion

This chapter has analysed two distinct cases of the same infrastructural form: the supply tunnel, which was first implemented as an experiment in the 1890s and then re-emerged as a component in the planning of the current inner-city development Grasbrook. It examined the context and discourses surrounding the planning, construction, and operation of the historical case as well as the considerations that led to the historical tunnel remaining an experiment; it also gave an account of the failure of the present-day tunnel project. From those analyses, this chapter has developed three dimensions of infrastructural contingencies produced by infrastructure's spatial, temporal, material, and institutional interrelations. The first dimension focuses on how various supply infrastructures rely on the same underground space for their networks, necessitating the spatial structuring and organization of various pipes, sewers, and cables. The second dimension considers the differing temporal and material realities of the distinct sectors and their resultingly varied maintenance and repair rhythms. These diverging rhythms have led to ongoing public de-

bates about the need for cross-sectoral coordination; however, this chapter also highlights the limits of such efforts. The third dimension examines how the unforeseeable and relational processes produced by the first two dimensions must be addressed at a governance level that includes not only cross-sectoral cooperation but also other urban actors and institutions.

These insights exemplify the highly contingent nature of infrastructures and their relation to wider urban processes. They demonstrate how contingency not only emerges from a specific (historical) context but also is produced by the entanglement and interrelation of different infrastructure sectors, illustrating how utility services attempt to manage these unforeseeable processes. Both of these tunnels have been attempts to address the inherent contingency of entangled urban infrastructure systems. The futility of these attempts demonstrates that the complexity of urban infrastructure cannot be resolved by large-scale, overarching plans but rather through small-scale, localized efforts that recognize the socio-material context in which this contingency arises and unfolds. Through such findings, this chapter contributes to infrastructural and urban research on theoretical, methodological, and empirical levels.

Theoretically, this chapter illustrates how infrastructures do not conform to linear narratives of progress and exemplifies their processual nature, as well as the dis/continuities in their development (Gandy, 2014; Moss, 2016). The examples of the two tunnels highlight how organizational concepts and technological advancements can be temporarily sidelined, only to re-emerge after more than a century, still facing similar challenges and concerns arising from the different contingencies generated by the various dimensions of infrastructural interrelations.

Building on these findings, methodologically, this input highlights the importance of historical analysis in urban research. When adopting an ontology centred around the relational and processual nature of the urban, it is important not to view history as somehow finished but as something deeply ingrained in the present and the future in multiple ways. To understand the urban and its infrastructures as a palimpsest of multiple material, temporal, and cultural layers that interact in unpredictable ways, it is necessary to take history seriously.

Finally, this chapter underlines the importance of empirically examining multiple infrastructure sectors, which still comprises a significant research gap in infrastructure studies (Monstadt and Coutard, 2019). To understand the various ways different sectors relate to one another and the resulting

broader implications for infrastructure planning and operation, it is essential to include various types of infrastructures within one research framework. Analysing Hamburg's infrastructures in this manner, using a particular moment of physical bundling as a starting point, reveals how various forms of infrastructural contingencies cannot simply be resolved by focusing on one sector but must be addressed on a broader level, including other infrastructure services and various public and private entities. In examining these interrelations and the efforts to manage them, this chapter also addresses the lack of research on how professionals engage with urban contingency.

These findings are also relevant for practice. In times of mounting socio-ecological crises, understanding the evolution of infrastructural relations and the im/possibilities to organize, coordinate, and cooperate is more crucial than ever, as it helps urban professionals deal with current uncertainties and anticipate uncertainties of the future – two very central tasks in urban future-making.

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Appendix: List of interviews

Date	Institution	Position
09.06.23	Hamburg Wasser (water)	Network operation
13.06.23	Hamburg Wasser (water and sanitation)	Network planning
30.06.23	Hamburg Wasser (sanitation)	Engineering, rehabilitation
19.07.23	Hamburg Wasser (water and sanitation)	Infrastructure development
01.02.24	Gasnetz Hamburg	Facility planning and operation
06.03.24	Gasnetz Hamburg	Grid operation and maintenance
19.03.24	HafenCity Hamburg GmbH	Project management

Shaping Decision-Making and Advancing Policies

13. Expecting the unexpected

Decision-centred models of planning in disruptive times

Oliver Ibert

Introduction

Professional planning has been defined as social action with the ambition to shape the future and the obligation to be rational (Siebel, 2006). While this definition is rather straightforward, the operationalization of what actually constitutes rationality is intricate and contested. There are different understandings of rationality, ranging, for example, from the scientific approach predominant in models of comprehensive planning which Rittel and Webber alluded to as 'systems analysis' (1973: 156), to the rationality of 'muddling through' (Lindblom, 1959: 79) as proposed in incrementalist approaches. Contemporary planning theory has increasingly focused on the political character of planning processes, and on negotiations among self-interested stakeholders and power constellations, as well as how to break these up by way of deliberative, communicative, and/or agonistic approaches (e.g. Hesse and Kühn, 2023). Such approaches advance the idea of a political rationality of planning where good solutions are found in processes of consensus building or conflict resolution among multiple stakeholders. By ascending to a level of meta-rationality, other contributors reflect upon the strengths and weaknesses of diverse individual approaches to rationality and find rationality in combining different approaches in productive ways while enduring their contradictions (Siebel, 2006; Ibert, 2009).

Decision-centred models of planning, which have been introduced in the field of spatial planning by Andreas Faludi (1985), specify the rationality that sets professional planning apart from other types of future-making activities by focusing on the professional planner as a decision maker. As a vantage point

of theorizing, this model, in short, describes planning as a reflexive process of decision-making during which decisions are made about decisions (Luhmann, 1971). Decision-centred models of spatial planning have been influential (and contested) for some decades, although they have received less attention more recently. In particular the timely approaches of deliberative and/or agonistic planning have delegated the planner as a professional expert for decision-making increasingly into subordinate roles of process organizers – or sometimes even as one of several participants in multi-stakeholder bargaining plays.

With a critical reinvigoration of decision-centred models of spatial planning, this chapter seeks to refocus on planners as professionally trained decision makers with a central role in future-making processes. Moreover, while the concept of rationality has been discussed widely in debates on planning theory, the boldness inherent in the ambition to *shape the future* has rarely been examined or problematized to date. This shortcoming also holds true for decision-centred models of spatial planning. Such models assume that planning precedes action. Subsequent decisions made in the course of action, which always have to be made under time pressure and immersed in a practical situation, achieve a higher degree of rationality if being prepared through planning (Faludi, 1985). This simple and compelling conceptualization of planning as a sequence of two distinct decision making activities, however, presupposes that planners when they are planning understand well the situation in which operational decisions will be made in the future. The implicit assumption is that planners have reliable expectations about the future when they plan – a problematic assumption, given diagnoses of the times that emphasize that we are witnessing 'disruptive' (Ibert et al., 2022) times and inhabit an increasingly 'turbulent world' (Scoones, 2024), but also when taking into account the increasing number of empirical observations of multiple crises, extreme events, market shocks, violent conflicts or political upheavals. Against this background, the contribution of this chapter is to explore avenues to advance a novel approach to decision-centred models of planning in which the only certainty about the future is that it most likely will be disruptive.

In the next section, the decision-centred model of professional planning is introduced and critically interrogated. Subsequently, a heuristic notion of disruption is synthesized from the rapidly evolving literature. Finally, important modifications necessary to make the decision-centred model of planning robust in the light of disruption are introduced, namely (1) responding to short-term challenges while maintaining long-term orientation, and (2) accomplishing short-term objectives while enhancing long-term flexibility.

Decision-centred models of planning

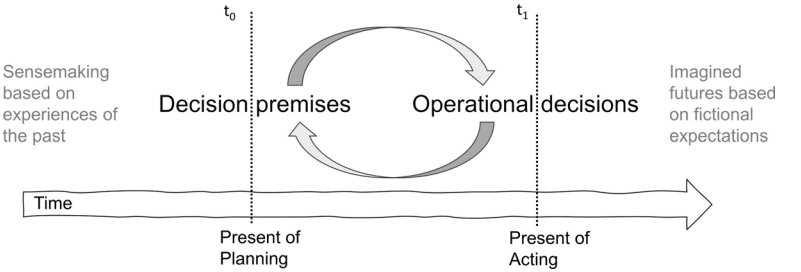
Decision-centred models of (spatial) planning are just one of several possible approaches to theorizing planning. The sociologist Niklas Luhmann (1971) defines the social activity of planning as a reflexive process of decision-making or, in short, as 'decisions about […] decision premises' (Luhmann, 2015: 29). By linking planning with decision-making, the social activity of planning becomes deeply rooted in everyday live. Planning can be seen as 'a prosaic, and ubiquitous, fact of life. It is always with us, in one way or another, because we are constantly either doing it ourselves or we are part of someone else's plan' (Clarke, 1999: 1). However, even in private circumstances, people sense a distinction between decisions with consequences for the future that can be made spontaneously, intuitively or simply by following traditions or societal expectations (see March, 1982, on 'decisions of appropriateness'), on the one hand, and decisions with the 'obligation to be rational' (Rittel and Webber, 1973; Siebel, 2006), on the other. Consider, for instance, the difference between making a choice about what movie to watch at the theatre tonight vis-à-vis a decision about enrolling with a university programme – both choices affect one's future, however, the first one can be taken spontaneously, while the second one calls for rationality, e.g. identifying different alternative choices, understanding the consequences of each alternative and valuing the consequences against the background of existing preferences.

The argument advanced here about the rationality of planning is less a claim of superiority in favour of rational choice models of decision-making. Rather, it is an argument in the pragmatist tradition that foregrounds the practical usefulness of planning in some social situations. Lee Clarke (1999) has introduced the distinction between the 'functional' and 'symbolic' values of planning. With regard to functionality, the obligation to act rationally is indeed expected to provide an extra value, for example, in the form of evidence-based decisions, systematic assessment of existing alternatives, enhanced certainty about future consequences or a more systematic valuation of alternative choices. With regard to the symbolic dimension, however, Clarke points out that the very fact that planning took place can be (mis)used to legitimate decisions by signifying 'control' and 'competence' to external stakeholders. 'Under conditions of high uncertainty the promise and apparatus of planning itself becomes mainly *rhetorical*, becomes means by which plans – independently of their functional relevance to the task – can be justified as reasonable promises that exigencies can be controlled' (Clarke, 1999: 4; emphasis in original).

The decision-centred model of planning, however, is not primarily concerned with planning as an everyday activity of individuals, but rather with *professional* planning as a collective and organized social activity as it is prevalent, for instance, in strategic management. According to Luhmann (1971; 2015), in a professional context, necessary conditions for true choices are a certain degree of 'arbitrariness' (Luhmann, 2015: 18) on the side of the decision maker, and a degree of uncertainty in the situation in which a decision is made. Only in such situations, Luhmann's argument goes, are professionally trained decision makers needed. If, in contrast, choices were fully determined and the situation completely transparent, a specialized and authorized decision maker whose decisions make a difference is neither plausible nor necessary (Luhmann, 2015). Moreover, unlike in everyday life, where planning and execution of a plan are usually made by the same individuals or groups, in a professional context planning is seen as the domain of professional planners. Deciding about decision premises (planning) and making operational decisions, in other words, have to be seen as separate tasks, executed by trained specialists and undertaken in distinct social contexts.

In decision-centred models, the functional claim of rationality lies in the fact that the process of decision-making takes two loops. In his seminal article Andreas Faludi (1985) introduces the notion of the 'operational decision' to denote those decisions that are made in the course of action, whereas a plan denotes a 'framework which guides us in our actions' (Faludi, 1985: 241) and thus supports operational decision-making. The process of developing and adapting this framework (in Luhmann's words: 'deciding about decision premises') is called 'planning' (ibid.). The rationality of planning is demonstrated by the fact that operational decisions no longer have to be made under time pressure and ad hoc but rely on already carefully elaborated decision premises. Even though decision makers of operational decisions are fully immersed in a situation they can make superior choices as they benefit from preparatory work that could be undertaken in advance, detached from the pressures and expectations characterizing a particular situation and without the immediate necessity to come to terms. With this definition, Faludi takes up and develops further Luhmann's (1971) idea of planning as a reflexive process of decision-making: 'The point of planning is seen as influencing operational decisions. […] If planning can *not* exert this influence, then it is not worth doing' (ibid.: 241; emphasis in original). With the distinction between operational decisions and decision premises, the temporal dynamics in processes of decision-making come to the fore (Figure 1).

Figure 1: Past, present, and future in the decision-centred model of planning.



Source: Author. Based on Luhmann, 1971; Faludi, 1985; Emirbayer and Mische, 1998; Beckert, 2016.

Decision premises pre-structure subsequent decisions; they simultaneously enable and constrain the space within which decision-making can happen. Decision premises can be more or less constraining, depending on the topic or the issue they are directed to. Furthermore, decision premises can take different shapes, for example, as 'programmes' (a fixed procedure of steps to be executed in predefined situations), 'role expectations' (predetermined communication within an organization) or 'personal traits' (individual value preferences, abilities or social responsiveness) (Luhmann 2015: 30f.).

Andreas Faludi (1985) presented an adaptation of decision-centred models of professional planning to the sphere of *spatial* planning. His intention was to integrate rather context-free 'processual' models of planning (such as, for instance, Luhmann's) with the specific requirements of environmental planning as represented by 'substantivist' approaches (ibid.: 239). For Faludi, the object of environmental planning is not the physical environment but, rather, '*the sum total of all operational decisions which the authority concerned could take with respect to environmental measures being addressed to land decision units (respectively to their title holders) within its jurisdiction*' (Faludi, 1985: 251, emphasis in original).

In comparison to other forms of professional planning, the distinctiveness of *spatial* planning is that it does not primarily address decisions within a single organization but is geared towards a multitude of 'land decision units' (ibid.) within the sphere of influence of a planning authority. Imagine, for instance, land use plans that cover certain territories and address all landowners within those territories who make operational decisions when developing their properties. These units represent sub-territories, each under individual (public or private) ownership, and each with a unique relational position in space and

equipped with specific sets of resources. These land decision units are influenced by multiple policy measures created in different parts of the administrative system, such as housing policies, economic development policies or ecological legislation, and distributed across scales in multilevel systems, from the local to the national or even supra-national level. Land ownership is most likely driven by self-interests. As each land unit occupies a unique location in geographical space, it represents a particular position from which operational decisions are made. Furthermore, these units are interrelated. The mutual influence between land decision units depends on how proximate or distant the locations are and how immediately they affect each other.

From a decision-centred point of view, the functional superiority of planning is seen in the existence of a framework that affords the possibility to consider multiple decisions in their interrelatedness. Taking operational decisions in spatial planning requires insights into a complex spatio-temporal system as well as into multilevel, public-private governance constellations (Faludi, 1985):

In the *temporal* dimension, plans afford operational decision-making in the course of action. In concrete, dynamically evolving situations, there is usually not enough time for proper preparation during operational decisions (Faludi, 1985). Therefore, all efforts previously invested in the design of decision premises allow operational decision makers to respond quickly in the course of action *and* to be well-prepared, as they have already identified the spectrum of choices, considered their consequences, and valued possible outcomes. Moreover, as decision premises have validity for several subsequent decisions, planning offers a chance that several decisions made at different points in time by different actors point in a similar direction, as is theorized, for example, in the notion of 'perspectival incrementalism' (Sieverts and Ganser, 1993).

In the *spatial* dimension, plans provide frameworks that allow participants to consider the particular positionality of land decision units, which each respond differently to policy measures due their unique location in space and which are mutually inter-related. This includes consideration of the different self-interests of landowners as well as public and private agendas with regard to land use. A plan, in other words, offers a chance that multiple decisions, made from different positions by operational decision makers with divergent interests, contribute to an overarching coherence nevertheless.

In the *institutional* dimension, plans afford a comprehensive view of different measures made by different state authorities located on different scales and/or in different sectors of the political-administrative system. Planning thus promises to coordinate such measures in a way that maximizes mutual

support and/or minimizes contradictory effects. Here again, the effects of measures on different decision makers can be considered.

Limitations of decision-centred models of planning

The decision-centred model of planning has never been undisputed, and it continues to create severe ambiguities in the practices of planning and strategic management (e.g. Rittel and Webber, 1973; March, 2006; Kornberger et al., 2019). However, such ongoing struggles indirectly assert the enduring relevance of the model. The rationality advantages outlined above are first and foremost promises, not evidence-proven performances of planning as will be demonstrated in the following paragraphs. Limitations of the decision-centred model of planning are related to the impossibility for planners to step aside the situation they are planning for, the moderate level of complexity that can be processed in planning processes as well as the neglect of power asymmetries. Most importantly, this chapter will discuss the insufficient conceptualization of uncertainties related to future making, especially in times which are characterized by disruption.

First, restrictions are related to the degree of complexity and the quality of uncertainty of the social context in which planning takes place. Planning does not make sense in very simple, transparent or fully determined situations (Luhmann, 2015), rather, an obligation to decide rationally is mainly felt in the face of some uncertainty and complexity. James G. March argues that rational technologies have good success rates, although 'these successes have not been repeated reliably in more complex situations' (March, 2006: 207). In a similar vein, Clarke (1999) seconds that planning works fairly well when the level of uncertainty is moderate, but as soon as the level of uncertainty increases, planning is no longer useful with regard to functionality. Instead, its symbolic value predominates. In this case, planning is likely to produce little more than 'fantasy documents' whose main practical usefulness is to signal control to external stakeholders where in fact there is no control. Contingency planning denotes an approach that contains 'actions that may or may not be executed, depending on the circumstances that hold at the time' (Pryor and Collins, 1996: 289). Such plans incorporate uncertainty by preparing for a set of contingencies and matches them with appropriate actions. However, as such plans simply incorporate complexity, they are very slow in responding to dynamic situ-

ations. Therefore, they work only in narrow and rather clearly arranged fields of application.

Second, decision-centred models of planning are relatively blind to questions of power asymmetries, even though, of course, in the practice of planning, the possibilities of successfully pursuing one's own interests are unequally distributed among the participants of a planning process, as political and conflict-theoretical approaches reiterate (Reuter, 2000). Within the decision-centred model, power can be addressed, but problems arising from power asymmetries cannot be resolved. With the professionalization of the planning function, the activities of making decision premises are delegated to a specialized group of actors that is no longer responsible for operational decision that become salient during implementation. This raises concerns about who actually has the legitimacy to create decision premises for other constituents. Furthermore, a dilemma of implementation can arise when actors responsible for decision-making in operation have not been involved in creating the decision premises. They might, for example, be unwilling or feel unable to act accordingly or they may pursue different interests. In the sphere of spatial planning, the implementation dilemma is even more pronounced, as here, usually state actors are assumed to create decision premises while private actors make operational decisions that actually change the socio-material space. Against this background, the growing power asymmetry between state actors and the private sector undermines the applicability of decision-centred models of spatial planning.

Third, decision-centred models of spatial planning include rather traditional ideas of rationality in the sense that 'cognition precedes action' (Kornberger et al., 2019). This assumption, however, is problematic as it suggests that it is possible to step out of the situation in order to reflect carefully upon possible actions and their consequences and to step in again, after having come to terms. However, Horst W.J. Rittel and Melvin M. Webber (1973) have reminded us that one of the 'dilemmas of planning' is that it necessarily takes place in situ and in real time. Hence, it is practically impossible to be rational, as both the exploration of alternative choices and the consideration of the respective consequences of those choices lead to potentially ever more loops of reflections, e.g. considering the consequences of consequences ad infinitum. Hence, in practice, they argue, there is no logical point to terminate a planning process. Moreover, as planning itself also has consequences, it would be necessary to also reflect on the consequences of a planning process before starting it. Again, there is no natural entry point to initiate a planning process, as these consider-

ations can be continued endlessly. Finally, if one nevertheless succeeds in starting planning, one soon realizes that the object of planning will evolve permanently. While forging decision premises, ongoing operational decisions create their own consequences. And these cannot be part of the plan. This last point reassures us that the analytical distinction between decision premises and operational decisions can easily become blurry in practice, as any decision made most likely changes the situation for subsequent decisions. Thus, operational decisions turn into decision premises as a matter of fact (Luhmann, 2015) with or without an intention behind that.

This chapter takes issue with the ambition of planning to shape the future and seeks to expand on the latter group of limitations. By putting the act of deciding centre-stage, decision-centred models of (spatial) planning enact a temporal order, similar to the model of social agency (Emirbayer and Mische, 1998), in which the moment of decision constitutes the present and separates the past, which can no longer be changed (but can, of course, be reinterpreted) from the future, where it has effects. When planning, planners make decisions about decision premises in the present in order to open up a space of possibility for operational decisions to be made in the future (Luhmann, 2015). At the same time, they reduce uncertainty through determining certain fixes with their decisions (Aspers, 2018). Operational decisions, in turn, constitute a present that benefits from efforts made in the past to constitute a framework for decision-making (Figure 1).

Planning is future oriented. As the future is by definition unknown, even unknowable, decisions in the present have to deal with uncertainty (Dequech, 2011; Scoones, 2024), in the sense that 'we cannot predict or foresee what will happen when acting or not acting' (Aspers, 2018: 133). Jens Beckert (2016) argues that social actors have to deal with this uncertainty in a productive way, otherwise they are overwhelmed by contingency and paralyzed by a state of undecidedness. In order to be able to make decisions with far-reaching consequences, Beckert (2016) argues, participants need 'fictional expectations' about the future. By confidently pretending to know about the future, they overcome the paralysis of not knowing and bring themselves into a new position in which it becomes possible again to make decisions. Of course, these decisions have consequences on the future, they might in fact contribute crucially to create the foreseen future. Such confidence and the related performative creation of the future is arguably also an intrinsic feature of planning. will primarily discuss a fourth type of restriction: 'future expectations' (Beckert, 2016).

Two decisive questions are thus: What kind of future is imagined when making decisions about decisions? And how accurate are the future expectations from the past that are inscribed into the decision-making premises in the light of the present in which operational decisions are actually made? The problem of inaccurate future expectations becomes even more severe in the light of recent debates that advance the idea that we are witnessing times of disruption in which mankind is more frequently than ever confronted with phenomena that evade a 'control-oriented, risk-based calculative approach, where we assume we know about and can manage the future' (e.g. Scoones, 2024: 2). Such time diagnoses are based on collective experiences made, for instance, during the global Covid-19 pandemic or the Russian invasion of Ukraine in February 2022. In the background, the slowly evolving process of human-induced global warming is increasingly framed as 'climate crisis', indicating that its consequences, such as storms, droughts, floods, and bush fires, have become tangible for many people in their everyday lives. In a comprehensive diagnose, diverse disruptive phenomena have been found to intersect and mutually enforcing each other, forming a systemic and emergent 'global polycrisis' (Lawrence et al., 2024). In addition to that, for many municipalities, more local and mundane events, such as the collapse of a bridge on a main traffic artery, or a surprising court decision, can have similarly disruptive effects. But what does disruption mean exactly?

Disruption is not an established concept with a clear definition. Rather, most typically, it is used as a self-evident attribute to more conventional terminology to specify a certain quality, as in the case of 'disruptive philanthropy' (Horvath and Powell, 2016) or 'disruptive innovation' (Christensen, 2006), or it is used as a verb ('to disrupt'). In the following, I provide a tentative definition of disruption with the help of a heuristic that synthesizes different semantic facets that are highlighted in the emerging debate.

Disruption denotes an 'intense period of change' (Mahanty et al., 2023: 177), which is a major change in a relatively narrow time frame. There are no fixed thresholds, for instance with regard to time frames or radicality of change, to unequivocally determine a disruption. It is unclear whether disruption denotes a process, or a stage in a process, in which 'probability and impact evolve over time' (Hernes et al., 2025: 2) – or only an (extreme) 'event' (e.g. Hällgren et al., 2018; Aquino et al., 2022; Hernes et al., 2025). As disruption is in the eye of the beholder, it can be characterized as a collectively perceived acceleration of change over the course of time.

Disruption takes the people it affects by surprise; they are hit 'off guard' (Hällgren et al., 2018) and are therefore ill prepared to respond quickly and adequately. The shock is perceived as being 'exogenous' (Hernes et al., 2025), as if coming from nowhere, disconnected from the known reality. Typically, in hindsight, actors realize overlooked warning signals and symptoms, so the feeling of surprise tells us more about the actors who perceive a disruption than about the event (or process) itself. Once established, disruption causes fundamental forms of uncertainty (Scoones, 2024). A source of uncertainty can be a classic lack of knowledge, but more importantly, it can be an ambiguity of meaning, in the sense that the situation supports several different, potentially contradictory meanings at the same time (Ibert et al., 2021). The focal change is too dramatic simply to be incorporated into existing cognitive frames; it is incompatible with existing interpretation patterns. For those who experience it, disruption can lead to what Weick has termed a 'collapse of sensemaking' (Weick, 1993), the inability to interpret what has happened or is about to happen with the available categories and schemes. Therefore, to re-establish normality in situations of disruption, participants need to create a novel worldview, one that includes the change associated with the disruption and that, in a way, 'makes sense' again. Such 'cosmology episodes' (Orton and O'Grady, 2016), for instance, 'force actors to draw novel connections between past and future events' (Hernes et al., 2025: 2). Moreover, also the 'temporal depth' (Bluedorn, 2002: 114), meaning the distance into the past and future that is considered, is open for consideration. In this regard, disruptions mark social 'tipping points' in the sense of a 'shift into a state from which reversal is difficult, if not impossible' (Hernes et al., 2025: 12).

Finally, disruption attracts (public) attention. Attention is a finite resource. It can be devoted to almost everything, and more and more people and problems compete for attention. However, the amount of attention an individual (or organization) can devote to something is limited, as attention requires focus and time. Therefore, attention has ascended into becoming *the* finite resource of human information processing and can be seen as a highly esteemed currency (Franck, 1998). In an attention economy, one no longer pays attention but pays *with* attention. From the multitude of societal problems that compete for attention, only few make it to the top of the political agenda. Thomas A. Birkland (2006) introduces the term 'attention-grabbing event' for dynamically escalating situations that, due to their emergency, urgency, and threat, literally force decision makers to pay attention. This provides an opportunity (and, of course, raises new ambivalences) to lift as yet underrated problems

onto the most prominent positions of the agenda (while ignoring other problems that deserve at least as much attention). Moreover, disruptions 'grab' our attention because not only do they pose intellectual challenges, but they also evoke strong, mostly averse emotions on behalf of social actors (Mahanty et al., 2024: 330).

For decision-centred models of spatial planning the insight that those expectations and assumptions about the envisioned future that have been inscribed in a plan will most likely be disrupted in surprising and unknowable ways is consequential. In the subsequent section these challenges are further elaborated and possible ways of adapting the decision-centred model to disruptive times are explored.

Infusing adaptability into decision-centred models

When uncertainty rises to a level of a 'collapse of sensemaking' (Weick, 1993) and attention is driven by the logics of popular media, the functional surplus of reflexively deciding about decisions appears limited. What can be done to make frameworks for operational decisions robust in the light of disruption?

First, 'future expectations' (Beckert, 2016) in professional spatial planning need to be radically rethought (Scoones, 2024). The insight that 'the future will most likely be anything but an extension of the present' (Gümüsay and Reinicke, 2024: 1) has to be embraced and incorporated into our expectations about the future. This requires, for example, a shift from 'probabilistic' to 'possibilistic' modes (Clarke, 2007; Grimes and Vogus, 2021; Scoones, 2024) or 'shifting attention away from the mean […] toward the tails or outliers. Anomalies represent a discrepant outcome relative to historical patterns and normative expectations' (Grimes and Vogus, 2021: 3). Possibilistic thinking cannot predict future disruptions: Such disruptions will continue to come surprisingly and hit social actors off guard. Yet, possibilistic thinking takes into account that plans made in the present can be, or, more to the point, most likely will be, disrupted in the future. In such a way, decision-centred models need to incorporate the expectation of the unexpected.

Second, as has been argued above, planning is usually needed at a medium level of complexity and uncertainty. In a world rife with disruption, decision makers are confronted with surprisingly and rapidly rising levels of uncertainty and with a devaluation of established rules, procedures, and interpretive schemes that, under ordinary conditions, can tame complexity. Hence, deci-

sion-centred models of planning need to be adaptable to sharply increasing levels of complexity and uncertainty.

Third, from an analytical point of view, the distinction between decision premises and operational decisions is rather clear. This suggests that planning is highly susceptible to disruptions because decision premises run the risk of making inappropriate assumptions about the future. It is one of the decisive features of disruption that rules and procedures that used to work well in the past no longer apply in the present, in a radically new situation. In the case of surprising change and radical uncertainty, in other words, planning might fail as alternative choices are missed, important consequences of decisions overlooked, and entrenched preferences are no longer valid. Moreover, strict connections between decision premises and operational decisions, as for instance in the case of 'programming' (Luhman, 2015), might force participants onto a too-narrow path of possibilities. Modes of 'contingency planning' (Pryor and Collins, 1996) are also not helpful in the light of disruption, as they become overly complex when confronted with fundamental uncertainty.

However, the basic idea that decisions can become more rational when participants purposefully engage in reflective loops of decision-making can still have traction in times of disruption. Two key ideas taken from the theorizing on 'robust action' (Padgett and Ansell, 1993) are compatible with the idea of decision-centred models of planning and are, in the following, discussed in terms of their potential to make planning in the face of disruption more 'robust' (Ferraro et al., 2015). The first one implies a moderate revision of the decision-centred model, the second one a more radical revision:

The first, moderate revision seeks to enhance the robustness of decision-centred planning by maintaining the temporal order of decision premises preceding operational decisions, but by relaxing the binding nature of decision premises for operation decisions. This approach highlights that decision premises are still helpful to maintain long-term orientation during operational decision-making. At the same time, the plan provides a wider framework which leaves higher degrees of freedom to enhance the ability of operational decision-making to be able to respond flexibility to short-term challenges. Crucially, in the case of disruption, operational decision making can be confronted with situations that have changed surprisingly and deviate fundamentally from former certainties. As Lucy Suchman (1987) has put it, plans should then no longer be understood as 'programmes' (Luhmann, 2015) that predetermine the subsequent execution of operational decisions but rather should be seen as multifunctional 'resources' that can be leveraged dur-

ing operational decision-making at different stages, for different purposes, and depending on the concrete situation.

Suchman (1987) uses the metaphor of a plan as a map that helps seafarers when navigating through rough seas towards their destination. The map provides a frame for possible decisions to be made during the journey. It can be used to determine the goal of the journey and to maintain the grand direction during the journey. However, the map is of little help if one tries to predetermine every single step during each stage of the journey, given the existence of uncontrollable (potentially disruptive) forces, such as pirates, heavy weathers, shallow areas, sickness or wind lulls. Turning to a recent situation of disruption, the immediate responses to the energy crisis following the start of the Russian war in Ukraine appear not very robust. Instead of subsidizing energy consumption with public money (which reduces economic pressures on citizens at the cost of further stabilizing a path away from long-term climate goals), the disruption could have been used as a valuable opportunity to strengthen efforts of energy saving (e.g. by reducing energy prices by limiting demand on energy, for example through a speed limit on German motorways). Both possible operational decisions are useful as immediate responses to the disruptive event, but the former sacrifices long-term goals with regard to climate policies, whereas the latter (not-taken) decision would have been more robust, as it would have contributed to the requirements of both short-term response and long-term transformation.

The general idea that a plan provides a 'framework for operational decisions' (Faludi, 1985) should be maintained even if, or more to the point, particularly when, the probability is high that subsequent operational decisions may need to be made under conditions of disruption. Plans can be seen as artifacts that afford 'multivocal inscription' (Ferraro et al., 2015), that is, a 'discursive and material activity that sustains different interpretations among various audiences with different evaluative criteria in a manner that promotes coordination without necessarily requiring consensus' (Ferraro et al., 2015: 373). The notion of sustainability, for example, is used prominently as a 'guiding principle' in § 1(2) of the German Raumordnungsgesetz (ROG), the federal spatial planning law, or as attribute to describe 17 development goals prioritized by the United Nations. It is concrete enough to be relevant to a diverse public, yet fuzzy enough to allow the coexistence of several meanings. This affords both an ongoing negotiation of its meaning and a certain degree of coordination among heterogenous, otherwise autonomous agents. Moreover, if disruptive events change the setting, the ambiguity caused by divergent yet co-existing

semantics in the same term can become productive by shifting from one connotation to the other: 'Allowing for dissonance is thus crucial to transform indeterminate situations into specific, defined problems and to open up alternatives' (Farias, 2015: 288).

More generally, societal 'values' (Göpel, 2025) have been discussed as useful signposts to set a frame for 'desirable futures' (Gümüsay and Reinecke, 2024). Societal values, such as liberty, equality or democracy, do not change easily. Even if societies are transforming rapidly, values can provide stable 'orders of worth' (Boltanski and Thévenot, 2006). In the face of disruptive change, values offer a chance to regain stable grounds from which it becomes possible to reassess a situation that has escalated beyond the cognitive frames that are usually utilized to make sense of the world. In practice, robustness of planning can thus be enhanced by making explicit reference to the values that underlie decision premises. For example, if one explains that the goal to become a climate-neutral region in the coming 10 years has been developed to achieve sustainability goals within a democratic consensus, the reference to values (here, sustainability and democracy) allows operational decision makers at later stages to reassess the decision premises and, if necessary, adapt them to radically new or slowly shifting circumstances.

The second, more radical revision of the decision centred model of planning is to reverse the established sequencing of decision premises and operational decisions in response to disruptions. Here, making operational decisions comes *before* decision premises, that is, decision premises are developed ex post from preceding operational decisions. This is, of course, possible because any decision made in the present turns into a decision premise for subsequent decisions, as has been argued above. This revision seeks to accomplish '*short-term objectives while maintaining long term flexibility*' (Eccles and Nohria, 1992 quoted in Ferraro et al., 2015: 371; emphasis added). The logic of this approach is to realize goals that are within reach while maintaining future flexibility. 'Such flexibility aims at avoiding irreversible damage to societal and planetary health and leaving in place desirable initial conditions and a range of options that allow future generations to realize their own goals and preferences' (Gümüsay and Reinecke, 2024: 17). In the light of such ideas, decisions in favour of privatization of public services, such as water, public transport or housing, which proliferated during the 1990s, have to be seen much more critically, as the short-term gains come at the cost of sharply delimiting possibilities for future-making (e.g. reduced numbers of housing units under control of the public). Moreover, such decisions that shift power

from state authorities to private firms reduce robustness, as they aggravate the implementation dilemma inherent in decision-centred models of spatial planning.

Taking into account the likely disruptions in the future, a 'plan can often be more effective as an interpretation of past decisions than as blueprint for future ones. It can be used as part of our efforts to develop a new, somewhat consistent theory of ourselves that incorporates our recent actions into some moderately comprehensive structure of goals' (March, 1982: 32). Reversing the sequential order between operational decisions and decision premises, in other words, can be extremely valuable and deliberating in times of high uncertainty and turbulent dynamics. 'Making do in difficult circumstances' (Scoones, 2024: 19) at first sight provides little more than a provisional relieve in a disruptive situation. Yet at the same time, such solutions might already contain seeds of more encompassing, long-term strategies as well. 'Goals may evolve and emerge from theorizing for an evolving system' (Gümüsay and Reinecke, 2024: 17). Along similar lines, Martin Kornberger, Stephan Leixnering, and Renate E. Meyer (2019) suggested that in times of crisis and uncertainty, decision-making may benefit from what they called the 'logic of tact'. With reference to the 19th Century Prussian general Carl von Clausewitz's (1780–1831) theorization of action in war situations, where decisions need to be made while the truth lies in the fog of uncertainty caused by the turmoil of the battle, tact is a mode of 'feeling out the truth' (Kornberger et al., 2019: 255) while acting. It combines ways of 'guessing' the truth out of partial information by trusting one's own experiences and intuition with a swift but bold and determined willingness to act, being fully immersed in the situation. In such situations it is impossible to follow a plan, but by 'rapidly switching between thinking and acting' (ibid.: 256) it becomes possible to develop a plan out of the insights won during action.

Planning in the light of disruption in this sense can become more robust through approaches of 'distributed experimentation' (Ferraro et al., 2015). This principle values the explorative potential of operational decisions and trusts in the 'truth' found in the fog of the struggle. This truth will (by some magic) subsequently solidify, transforming into future decision premises. In a critical appraisal of rational strategic management, March concludes that traditional forms of strategic management derive their adaptive advantages of exploitation only under relatively simple conditions. However, when complexity increases and uncertainty prevails, they suffer from 'adaptive myopia', which can lead to dramatic failures. He therefore suggests that strategic management must equally pursue the exploitation of existing knowledge and the exploration

of new knowledge. To balance exploitation and exploration, he refers, for example, to practices of making 'small experiments with wild ideas, while retaining the possibility of diffusing those that prove to be good ones' (March, 2006: 210).

The principle of distributed experimentation becomes visible in the evolution of 'collaborative workspaces' (Stockdale and Avdikos, 2025) and their diffusion from urban to rural regions during the past two decades. These spaces originally emerged in a few urban centres as experiments to test 'wild ideas' about how to host the work practices of digital nomads and workers in other creative occupations. Later, coworking evolved into a common and widely shared new work practice across a range of professions, though its locations still predominantly occurred in urban areas. Only very recently have these solutions travelled to rural areas and peripheral locations; however, in this context, as an additional infrastructure to complement mobile and multilocal work practices that encompass the classical office in the centre and the 'home office' in the periphery (Schmidt, 2019). With the parallel unfolding of such an idea and the movement of that idea in different spaces, isolated solutions tailored to idiosyncratic local conditions can consolidate to general approaches that can be adapted to different contexts. When higher-level policy-making levels start to design programmes to support such solutions, such ideas can also be 'scaled up' (Kern, 2019) in order to 'touch down' elsewhere.

Experiences collected during the past three or four decades in what has been termed 'innovation-oriented planning' modes (Ibert, 2003) can become fruitful to enhance the robustness of decision-centred models of planning. For example, such innovation-oriented planning modes relax the binding nature of decision premises that are usually formulated in formally decided land use plans in order to open up possibilities for novel and local solutions. Moreover, such approaches afford multiple local experiences with experimental solutions, as they are 'anchored' at the local level, for example by citizen participation (Butzin et al. 2024) and thus resemble what Ferraro et al. have called 'distributed experimentation' (2015: 376f.). Innovation-oriented planning modes were pioneered during the International Building Exhibition Emscher Park (1989–1999) and have, since then, been further diffused within professional communities of planning practitioners (Füg and Ibert, 2020). The International Building Exhibition (IBA) format has experienced a boom since the early 2000s (Sept and Kurth, 2024), and the principle has been transferred to other types of festivals too, for instance, state garden shows (German: Landesgartenschau) (Diller, 2020) at the national, state, or regional level. More

recently, the ecology of innovation-oriented practices has been supplemented with a plethora of lab formats enabling real-life experiments and all kinds of spatial contexts. Such instances can be interpreted as 'prefigurative sites for experimentation and innovation' (Scoones, 2024: 22) and as contrafactual instantiations of the future in the present.

Conclusion

In this chapter I presented the decision-centred model of spatial professional planning in order to scrutinize how it should be adapted when taking into account the insight that the only certainty we have about the future today is that it will continue to be disruptive. Disruption, in short, can be defined as intense periods of change that hit affected people surprisingly and off guard. Therefore, disruption gives rise to high levels of fundamental uncertainty that challenge people not only intellectually but also emotionally. Under these conditions, it is argued, the traditional model of planning as making decisions about operational decisions is widely challenged. In this chapter I advance the argument that the general idea that planning can be described as a reflexive process of decision-making (Luhmann, 1971; 2015; Faludi, 1985) needs to become more 'robust' (Ferraro et al., 2015). Two distinct though related revisions of the decision-centred model have been identified and discussed, a moderate revision and a more radical one.

The first, moderate revision of decision-centred planning models, maintains the general relationship between decision premises and operational decisions. A plan in the sense of a framework for decision-making still exists, but it makes planning more robust by providing only a wide frame that affords a great amount of flexibility and agility for operational decisions. This openness enhances the capabilities to respond swiftly and improvise openly when being hit by disruption. At the same time, the plan still provides long-term goals and explains the underlying values to provide signposts to assess the consequences of operational decisions.

The second more radical revision of decision-centred models reverses the traditional sequencing of reflexive decision-making; it shifts from 'cognition precedes action' to 'action precedes cognition' (Kornberger et al., 2019). Here, widely disconnected operational decisions at a local level predominate, with the idea that the 'truth' that can be found in an immediate immersion with practical problems will consolidate over time and eventually turn into novel

decision premises for others not by design but de facto. In other words, 'wild ideas' (March, 2006) can become surprisingly useful when a response to unexpected challenges is required. It has been argued that innovation-oriented planning approaches (Ibert, 2003) at first sight appear to produce little more than a seemingly chaotic redundancy of novel solutions. However, in the case of disruption, some of these solutions may prove a surprising value in response to these unforeseen challenges. Having proven themselves to be a good preparation for stakeholders to respond effectively in the event of disruption, there is a possibility that they could be further developed into integral components of more comprehensive new strategies.

Both, the moderate and the more radical suggested revision of decision-centred models of planning presented above promise to make such approaches more robust in turbulent times. By expecting the unexpected, planners increase their ability to respond flexibly to disruptions, while leveraging the long-term orientation and stability of their plans as a valuable resource.

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14. Safe anchorage or all at sea?

Comparing climate adaptation laws, plans, and policies for deeply uncertain port city futures[1]

Alexander Stanley

Introduction

Climate adaptation risk in ports and port cities has emerged as a prominent issue in recent years (Hanson et al., 2011; Hallegatte et al., 2013; Asariotis et al., 2017; Christodoulou et al., 2019; Fernandez-Perez et al., 2024). Many studies explore the impacts of extreme events, such as coastal flooding, heatwaves, and extreme rainfall, through various concepts of risk (Izaguirre et al., 2021; Verschuur et al., 2023a; Verschuur et al., 2023b). One widespread risk concept consists of four interdependent elements: hazard, exposure, vulnerability, and response (Ara Begum et al., 2023). Contingency is inherent in this concept due to the various ways and proportions in which the four elements may combine in any given risk. But these prominent risk studies raise a number of broader contextual questions. In particular, what deeper contingencies lie behind port city climate risks, and what are the implications for port city governance?

Previous port risk studies appear to overlook these deeper contingencies. Several studies produce 'rankings' of relative risk but differ significantly depending on the metric of interest (Hanson et al., 2011; Hallegatte et al., 2013; Izaguirre et al., 2021; Verschuur et al., 2023b). Many studies are global, large-*n*, and quantitative (Izaguirre et al., 2021; Verschuur et al., 2023a) and rely on sharp political boundaries for comparability (Hallegatte et al., 2013; Roberts et al., 2021). Yet this overlooks the highly contextual, qualitative, and blurred

1 This research was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC 2037 'CLICCS – Climate, Climatic Change, and Society' – Project Number: 390683824.

nature of port city relationships in reality (Hein, 2019). Further, studies often focus on the hazard and exposure elements of risk, and 'hard' infrastructure responses, rather than on the vulnerability and response elements, and 'soft' infrastructure responses such as law and policy (Mutombo et al., 2020; Notteboom et al., 2022: 521). Readily changeable law and governance arrangements could, however, establish enabling conditions for effective climate adaptation (New et al., 2023: 2580–84). Moreover, fragmented port governance arrangements are ripe for reform (van Hooydonk, 2010; Notteboom et al., 2022).

For all these reasons, this chapter identifies three key contingencies in port city governance and explores 'soft' infrastructure responses to climate risk. It examines climate adaptation planning in two port city case studies, Hamburg and Cape Town, and adopts a comparative law approach, where enquiry is driven by partial functional equivalents and structural comparison centred on climate adaptation planning (Reitz, 1998; van Hoecke, 2015). Both these port cities exist in systems of multilevel governance, as Germany and South Africa both have new national framework laws for climate adaptation planning, which are compared here for the first time down to the city level. However, each differs significantly in port and city governance arrangements. Despite these differences, there are sufficient structural parallels for fruitful comparison. To that end, comparative legal analysis sheds light on alternative ways of regulating, and this can provide fertile ground for reform (van Hoecke, 2015). Thus, this chapter asks: How do emerging climate adaptation governance frameworks enable and constrain planning for climate risks in port cities? The aim is to illuminate how three critical contingencies in port city governance affect planning professionals' capacities to plan for different climate futures.

Contingencies in port city governance

Other chapters in this volume invoke various concepts of contingency in different contexts of urban future-making. This chapter investigates adaptation planning for port city climate futures. Contingency is considered in this context along three dimensions, reflecting three distinct meanings (see Pohl et al., this volume).

First, there is the (obsolete) sense of contiguousness or coming into contact. By definition, ports are spatially contingent places, contiguous with a water body and a hinterland. Ports are both a built structure and a continuing

use of land and waters over time (Taneja, 2013). Ports therefore connect to adjacent physical and human geography, including climates, cities, cultures, and economies (Hein, 2019). Urban and technological development adapt the water-port-hinterland interface, but its essential dynamism remains. On the adaptation front line, port city futures challenge existing *assumptions* about the various spaces interacting at this interface.

Second, there is the sense of conditionality and dependency. Because ports exist to serve societies, complex legal and political orders exist to regulate both port and society. These orders emerge historically, but they are liable to internal reconfigurations at any time. Within a prevailing order, law is an important tool for enabling and constraining human action in different fields. Law's functions are not only to command and control, or to express normative societal values, but also to shape the mental models of those it regulates (Hoff and Walsh, 2021). In other words, law not only expresses the societal intention to control ports and cities, and controls them as such, but law also shapes how planning professionals think. The laws prevailing at any time thereby *shape* the future. Law mediates between what a port city is and what it might become, how it develops, and who is responsible for its development.

Third, there is the aleatoric sense of contingency, relating to accident or chance. This sense is inherent in many climate risks. Law traditionally regulates these risks through disaster laws, which impose requirements both in preparation for and in response to extreme events. However, climate adaptation simultaneously requires adjustments to changing climate boundary conditions while also preparing for and responding to extreme weather events. At the same time, the changing boundary conditions are transforming the likelihood of these events. In a common analogy, the probability of an extreme weather event is compared to rolling dice. As the climate system warms, its properties change and the die is no longer a perfect cube, but rather irregularly deformed. This severely affects the ability to predict extremes and makes planning for climate risks deeply uncertain (Stainforth, 2023: chs. 4, 10). Such dynamic circumstances render rigid rules untenable and severely test traditionally reactive disaster laws. But law can still regulate through proactive, cross-sectoral, and iterative *procedural* rules 'overlaying' other laws (Ruhl and Salzman, 2013: 1017–19). Here the question becomes: Has the law provided a contingency plan?

Each of these three key contingencies interacts with the others. For example, climate risks have particularly disruptive potential in terms of direct physical impacts on the water-port-hinterland interface, but also indirect impacts

on the legal and political order. This chapter focuses on the second key contingency, prevailing law and governance, because it is arguably easier to change the established legal and political order than it is to move a port or change the climate. The practical effects of these contingencies are explored in the circumstances of two case studies.

Case studies

Hamburg is Germany's second-largest city, located in the northwest of the country on the River Elbe, flowing into the North Sea. Hamburg is host to one of Europe's biggest ports, owned under a 'landlord' model by the Hamburg Port Authority (HPA), a city-controlled public law body, and run by private terminal operators (Notteboom et al., 2022: 189, parts III–IV). The city owns a controlling majority in the main terminal operator company, the HHLA AG.[2] Under the landlord model, a port authority is typically responsible for land use and basic infrastructure planning, while separate (often private) terminal operators own and operate built infrastructure (Notteboom et al., 2022: 149–50).

Cape Town is South Africa's second-largest city and the capital of Western Cape Province, located in the southwest of the country, overlooking Table Bay. Cape Town hosts South Africa's second-busiest port, owned under a 'landlord' model by Transnet National Ports Authority (Pty) Ltd,[3] and operated by Transnet Port Terminals. Both are controlled by a national state-owned enterprise, Transnet SOC Ltd.

These two port cities will be used to navigate the rough seas of multilevel port city law and governance. As summarized in Table 1 below, the analysis proceeds from the international through to the local levels. Each level is discussed sequentially below.

2 Hamburger Hafen und Logistik Aktiengesellschaft.

3 National Ports Act 12 of 2005 ss 1–3 (NPA).

Table 1: Summary of laws and policies analysed in comparative case study analysis.

		Hamburg	Cape Town
International level	Law	UNCLOS Paris Agreement/UAE Framework EU regulations + directives	UNCLOS Paris Agreement/UAE Framework AU Charter
	Policy	International standards (ISO) World Association for Waterborne Transport Infrastructure (PIANC) Global Covenant of Mayors (GCoM) Sendai Framework	International standards (ISO) World Association for Waterborne Transport Infrastructure (PIANC) Global Covenant of Mayors (GCoM) Sendai Framework
National level	Law	Grundgesetz (GG) Federal Climate Adaptation Act 2024 (KAnG)	Constitution of South Africa Climate Change Act 2024 (CCA)
	Policy	2009 Critical Infrastructure Strategy (KRITIS-Strategie) 2021 Federal Climate Impact and Risk Analysis 2022 German Strategy for Strengthening Resilience to Disasters 2024 German Climate Adaptation Strategy (federal PCAS) 2024 National Strategy for Sea and Inland Ports	2011 National Climate Change Response White Paper (NCCRP) 2020 National Climate Change Adaptation Strategy (NCCAS) 2022 Port Framework Development Plan
Subnat. level	Law	Hamburg Climate Protection Law (HmbKliSchG)	(None)
	Policy	2025 Hamburg Climate Adaptation Strategy (state PCAS)	2023 Western Cape Climate Change Response Strategy (WCCCRS)
Local level	Policy	Local Adaptation Concepts (pending)	2019 Climate Change Hazard, Vulnerability and Risk Assessment 2021 Climate Change Strategy 2021 Climate Change Action Plan (CCAP)

Source: Author.

International level

Both Germany and South Africa are party to the United Nations Convention on the Law of the Sea.[4] UNCLOS establishes a hierarchy of maritime zones subject to varying national influence, including the 'territorial sea' extending 12 nautical miles from the coast.[5] For the purpose of measuring the territorial sea, ports and harbours are part of the coast.[6] In a landmark Advisory Opinion, the International Tribunal for the Law of the Sea said UNCLOS parties must protect, preserve, and restore (if degraded) the 'marine environment',[7] which extends beyond maritime zones to coasts and estuaries.[8] Parties must also cooperate on science and information exchange about adaptation measures.[9] ITLOS also said adaptation under the Paris Agreement is 'compatible' with adaptation under UNCLOS.[10]

Germany and South Africa are both party to the Paris Agreement as well.[11] It establishes a global goal on adaptation to enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change,[12] and it requires parties to engage in adaptation planning.[13] These obligations are further elaborated in the United Arab Emirates (UAE) Framework for Global Climate Resilience.[14] The UAE Framework consists of a four-step iterative

4 United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397 (UNCLOS).

5 Ibid., art. 3.

6 Ibid., art. 11.

7 Ibid., art. 192.

8 'Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law' (Advisory Opinion, 21 May 2024) Case No. 31 (ITLOS Advisory Opinion) paras. 168, 441(4)(b).

9 Ibid., paras. 321, 441(3)(j), (4)(a).

10 Ibid., para. 394.

11 Paris Agreement to the United Nations Framework Convention on Climate Change (adopted 12 December 2015, entered into force 4 November 2016) 2316 UNTS 14 (Paris Agreement).

12 Ibid., art. 7(1).

13 Ibid., art. 7(9).

14 'Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA) on its fifth session' (Dubai, 30 November–13 December 2023) (15 March 2024) UN Doc FCCC/PA/CMA/2023/16/Add.1, Decision 2/CMA.5; 'Report of the CMA on its fourth session' (Sharm el-Sheikh, 6–20 November 2022) (17 March 2023) UN Doc FCCC/PA/CMA/2022/10/Add.1, Decision 3/CMA.4, paras. 8–10.

adaptive cycle: (1) impact, vulnerability, and risk assessment; (2) planning; (3) implementation; and (4) monitoring, evaluation, and learning.[15] It also anticipates adaptation planning across sectoral 'themes' and 'cross-cutting' considerations.[16] These are the overarching climate adaptation obligations at international law.

More specific obligations arise under other international laws. Germany and South Africa are members of the International Organization for Standardization (ISO). The ISO develops technical standards at the international level that are relevant in professional planning across scales.[17] National laws often transform ISO standards into binding domestic law. German and South African ports are also members of the World Association for Waterborne Transport Infrastructure (PIANC), which issues non-binding technical guidance on climate adaptation planning in ports.[18]

In addition, Germany and South Africa are signatories to the Sendai Framework for Disaster Risk Reduction.[19] This is a non-binding political agreement, which nevertheless aims to integrate and coordinate a risk-based approach to disaster planning and governance across scales. Another 'grey area' arises from both Hamburg's and Cape Town's membership of the Global Covenant of Mayors (GCoM). This is a transnational network operating directly between member cities. Although membership is voluntary, GCoM establishes a 'binding'[20] common reporting framework, including adaptation planning.[21] Member cities must conduct a climate risk and vulnerability assessment

15 'Report of the CMA on its fourth session' (n 63) para. 10(a).

16 Ibid., subparas. 10(b)–(c).

17 E.g. ISO Standard Nos. 9001:2015 (Quality management systems – Requirements); 14001:2015 (Environmental management systems – Requirements); 31000:2018 (Risk Management – Guidelines); 14090:2019 (Adaptation to climate change – Principles, requirements and guidelines).

18 PIANC, 'Climate Change Adaptation Planning for Ports and Inland Waterways', 2020 (WG Report No 178); PIANC, 'Managing Climate Change Uncertainties in Selecting, Designing and Evaluating Options for Resilient Navigation Infrastructure', 20 April 2022 (Technical Note No. 1).

19 'Sendai Framework for Disaster Risk Reduction 2015–2030', Third United Nations World Conference on Disaster Risk Reduction (Sendai 14–18 March 2015) UN Doc A/CONF.224/CRP.1.

20 GCoM, 'Global Covenant of Mayors Common Reporting Framework', April 2023 (Version 7.0), p. 8.

21 Ibid., pp. 17–19, 26–28.

spanning at least the city's boundaries within 2 years of joining GCoM.[22] Cities must then prepare adaptation plans, including goals with baselines and targets,[23] within 3 years of joining and update these plans every 2 years.[24]

Finally, Germany and South Africa are Member States in supranational political and economic unions, which further complexify their respective legal orders.

Germany is a member of the European Union (EU). In the EU, there are two main types of legislation: regulations and directives. EU regulations directly bind Member States, whereas EU directives impose binding results, but Member States have latitude to implement them via appropriate national instruments.[25] The EU's Climate Governance Regulation[26] requires Member States to report every 2 years on adaptation goals, plans, and strategies as part of integrated climate progress reports.[27] However, there are few EU laws that apply specifically to climate adaptation in ports. One EU regulation requires consideration of climate adaptation as part of integrated transport planning.[28] An EU directive requires national risk assessments and critical infrastructure planning.[29] Meanwhile, several other EU directives establish integrated legal frameworks regulating the interface between land and territorial waters, and thus apply to ports,[30] but these directives adopt inconsistent spatial definitions. There is no legally binding regime for integrated port planning at the EU level.

22 Ibid., pp. 8, 17.

23 Ibid., p. 19.

24 Ibid., p. 28.

25 Consolidated version of the Treaty on the Functioning of the European Union [2012] OJ C326/47 art. 288.

26 Council Regulation (EU) 2018/1999 of 11 December 2018 on the Governance of the Energy Union and Climate Action [2023] OJ L328/1.

27 Ibid., arts. 4(a)(1)(iii), 17(2)(d), 19(1) and pt. I annex VIII.

28 Council Regulation (EU) 2024/1679 on Union guidelines for the development of the trans-European transport network amending Regulations (EU) 2021/1153 and (EU) No. 913/2010 and repealing Regulation (EU) No. 1315/2013 [2024] OJ L2024/1679/1 arts. 23(6)(c), 28(f), 45(j), 46, 54(3)(j).

29 Council Directive 2022/2557 of 14 December 2022 on the resilience of critical entities [2022] OJ L333/164.

30 E.g. Council Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy [2014] OJ L327/1; Council Directive 2007/60/EC of 23 October 2007 on the assessment and management of flood risks [2007] OJ L288/27.

South Africa is a member of the African Union (AU), an emergent legal order. The AU has an as-yet-inoperative charter for African maritime transport,[31] which South Africa has ratified. This would require state parties to make national port authorities 'sustainable',[32] ensure port efficiency,[33] and encourage port privatizations.[34] It would also require interstate cooperation on marine transport operations,[35] infrastructure,[36] legislation,[37] and marine disaster preparedness.[38] Implementation would be via relatively weak state 'plans of action'.[39] In addition, the AU has a 'Blue Economy' strategy, emphasizing local, robust, and resilient adaptation.[40] However, none of these establish integrated port adaptation planning.

National level

Germany and South Africa each have a written constitution. These national constitutional orders were recently supplemented by specific climate adaptation laws.

Germany is a federal republic consisting of two levels of government: the federal government (*Bund*) and subnational state governments (*Länder*). Municipal governments (*Kommune, Gemeinde, Kreise*) are regional subunits of states. Hamburg has dual status as a federal city-state but has no constitutionally recognized subunits (Gern and Brüning, 2019).

The German Basic Law (GG) establishes fundamental rights to life, health, and future generations' essential conditions for life.[41] A landmark decision

31 Revised African Maritime Transport Charter (adopted 26 July 2010, not yet in force) (2010) art. 49(1).

32 Ibid., art. 7(1).

33 Ibid., art. 29(1).

34 Ibid., art. 22(2)(a).

35 Ibid., art. 12.

36 Ibid., arts. 20, 34.

37 Ibid., art. 23.

38 Ibid., art. 28.

39 Ibid., art. 41.

40 African Union Inter-African Bureau for Animal Resources (AU-IBAR), Africa Blue Economy Strategy, October 2019; AU-IBAR, 'Africa Blue Economy Strategy: Implementation Plan 2021–2025', 2020, p. 27.

41 Grundgesetz (GG), arts. 2(2), 20a.

of the Federal Constitutional Court said these rights require federal government adaptation action.[42] Yet any federal action is subject to the GG, which distributes lawmaking powers between federal, state, and municipal governments. Municipal powers are limited to 'local affairs',[43] whereas state and federal powers govern over wider issues. Alongside exclusive federal powers,[44] there are concurrent federal-state powers, including spatial planning,[45] fishing and coastal protection,[46] and shipping and navigation.[47] These concurrent powers take two forms: (1) federal pre-emptive or overruling powers, where federal laws prevent any further state law in the field,[48] and (2) divergent federal-state powers, where state laws may deviate from federal laws and, in the case of any conflict, the most recent law prevails.[49] Spatial planning is one such divergent power.[50] In other fields not mentioned in the GG, states retain exclusive lawmaking power.[51] This includes seaports and territorial seas, though the federal level controls inland waterways, including the River Elbe.[52]

The federal government has prepared several plans relevant to port adaptation. The 2024 German Climate Adaptation Strategy is discussed further below. Most relevantly, the 2024 National Strategy for Sea and Inland Ports[53] calls for 'regular' risk analyses by port authorities.[54] The strategic goal of climate-resilient ports contemplates individual port adaptation strategies, based on federal climate risk assessments.[55] Elsewhere, the country's dated critical in-

42 Bundesverfassungsgericht (BVerfG), Beschluss des Ersten Senats vom 24 März 2021, 1 BvR 2656/18, Rn. 1–270, paras. 144, 150, 177.
43 GG art. 28(2).
44 Ibid., art. 73(1).
45 Ibid., art. 74(1)(31).
46 Ibid., art. 74(1)(17).
47 Ibid., art. 74(1)(21).
48 Ibid., art. 74(1).
49 Ibid., art. 72(3).
50 Ibid.
51 Ibid., art. 70(1).
52 Ibid., art. 89.
53 Federal Ministry for Digital and Transport (BMDV), National Strategy for Sea and Inland Ports, February 2024.
54 Ibid., p. 16.
55 Ibid., p. 62.

frastructure strategy[56] and recent resilience strategy[57] provide cross-cutting policies for critical infrastructure protection. The latter reflects a risk-based, all-hazard approach including state and non-state actors.[58] But beyond these policies, there is not (yet) any integrated national legal framework for critical infrastructure in Germany. This follows a recent failed draft law[59] to establish such a national framework and implement both the Sendai Framework and relevant EU directives. In the meantime, disaster management remains both a federal and a state responsibility, also requiring local disaster management plans.[60]

Meanwhile, South Africa is a parliamentary republic consisting of three spheres of government: national, provincial, and municipal.[61] Municipal governments are subcategorized as metropolitan, district, or local.[62] Cape Town is a metropolitan municipality (Category A).

South Africa's Constitution imposes a unique duty of intergovernmental cooperation.[63] All organs of the state must uphold the Bill of Rights, including environmental rights imposing a constitutional duty to respond to climate change (Fuo et al., 2022: 45). National and provincial governments have concurrent legislative competence over the environment, regional planning, and disaster management.[64] However, whereas provinces are responsible for disaster planning,[65] metropolitan municipalities are responsible for managing declared local disasters.[66] Municipalities are self-governing, with broad powers[67] subject to any national and provincial legislation to the contrary.[68] Municipalities are ordinarily responsible for coastal infrastructure and city plan-

56 Bundesministerium des Innern (BMI), Nationale Strategie zum Schutz Kritischer Infrastrukturen (KRITIS-Strategie), 17 June 2009.

57 Federal Ministry of the Interior (BMI), German Strategy for Strengthening Resilience to Disasters, 31 July 2022.

58 Ibid., pp. 62–63.

59 KRITIS-Dachgesetz.

60 GG arts. 35, 73(1)1; Bundes-Zivilschutz-und-Katastrophenhilfegesetz; Hamburgisches Katastrophenschutzgesetz (HmbKatSG).

61 Constitution of the Republic of South Africa 1996 s 40.

62 Ibid., s 155(1)(a)–(c).

63 Ibid., chap. 3.

64 Constitution s 104(1), sch. 4A.

65 Disaster Management Act 57 of 2002 (DMA) ss 28–41.

66 Ibid., ss 42–55.

67 Constitution s 156; schs. 4B, 5B.

68 Ibid., s 151(3).

ning, but not shipping.[69] Ports are a special case: Gazetted port areas are removed from city boundaries,[70] and the Cape Town port area includes the modern harbour and much of Table Bay.[71] Ports are also specifically excluded from coastal management legislation.[72] Instead, one national authority is responsible for all ports, including land use planning, with no detailed planning or monitoring responsibilities.[73] Port plans mention short- (10 year), medium- (10–30 year), and long-term (>30 year) planning horizons but do not mention climate change.[74] A critical infrastructure law also applies to ports,[75] but this legislation is security-based and does not regulate infrastructure planning.

Within these constitutional arrangements, new national framework laws for climate adaptation planning were recently enacted in Germany and South Africa.

In Germany, the Federal Climate Adaptation Act (KAnG)[76] aims to reduce climate impacts, preserve socioecological resilience, and reduce social inequality.[77] The KAnG requires all German public authorities to consider its aims in integrated, multisectoral planning.[78] It also imposes adaptation planning procedures on all levels of governments, at each government level, as described below. Climate mitigation is regulated under a separate Climate Protection Act.[79]

The KAnG envisages a federally coordinated approach. Federal climate risk analyses, including middle- and long-term climate scenarios, must be prepared every 8 years. This analysis must identify especially vulnerable regions and consider how individual risks and action areas interact, with this data publicly available.[80] The risk analysis informs preparation of a 'precautionary

69 Ibid., sch. 4B.

70 NPA s 10(3).

71 National Government Gazette No. 32873, 22 January 2010, pp. 28–29.

72 National Environmental Management: Integrated Coastal Management Act 24 of 2008 ss 1, 6(4), 7(2)(a), 13(5), 18(4), 56(5).

73 NPA ss 10(1), 11, 16, 68–69.

74 Transnet National Ports Authority, 'Port Development Framework Plans 2022 Update' (2022) chap 1.2.

75 Critical Infrastructure Protection Act 8 of 2019.

76 Bundes-Klimaanpassungsgesetz (KAnG) vom 22 Dezember 2023 (BGBl 2023 I Nr 393).

77 Ibid., §1.

78 Ibid., §8.

79 Bundes-Klimaschutzgesetz vom 12 Dezember 2019 (BGBl I S 2513), geändert durch Artikel 1 des Gesetzes vom 15 Juli 2024 (BGBl 2024 I Nr 235).

80 KAnG §4.

climate adaptation strategy' (PCAS), to be updated every 4 years.[81] A federal PCAS must identify 'measurable' goals, indicators, and policy measures across seven clusters, including – most relevantly – infrastructure, water, the economy, and regional planning and civil protection.[82] Diverse stakeholders must be consulted in determining these goals, indicators, and measures.[83] A federal PCAS should identify monitoring and evaluation mechanisms, as well as recommend actions to be taken by the states.[84] Federal and state governments must cooperate towards reaching the goals of any PCAS.[85]

The climate adaptation planning envisaged by the KAnG is emerging. The latest federal climate risk assessment was in 2021.[86] In 2024, the first federal PCAS was released.[87] Across seven clusters, the federal PCAS sets out 33 goals and 45 sub-goals, together with indicators and implementation measures. The 'Infrastructure' cluster identifies a goal to optimize transport and logistics on federal waterways during low flows by 2030–40.[88] This includes a sub-goal to advance federal waterway adaptation planning guidelines,[89] and implementation actions relevant to Hamburg's port.[90] Meanwhile, 'Water' cluster goals include strengthening water infrastructure resilience,[91] reducing rain damage,[92] and developing local risk maps.[93] The 'Economy' cluster aims to mainstream climate risks in company decisions[94] by developing national standards

81 Ibid., §3(1).
82 Ibid., §3(2).
83 Ibid., §3(4).
84 Ibid., §3(3).
85 Ibid., §9(2).
86 Umweltbundesamt, Klimawirkungs- und Risikoanalyse für Deutschland 2021, Juni 2021.
87 Bundesministerium für Umwelt, Naturschutz, Nukleare Sicherheit und Verbraucherschutz, Deutsche Anpassungsstrategie an den Klimawandel 2024, 11 Dezember 2024.
88 Ibid., I-1.
89 Ibid., I-1.7.
90 Ibid., Annexure 2 – Adaptation Action Plan IV, I-W.14–15, 19, pp. 288–90.
91 Ibid., Wa-2.
92 Ibid., Wa-2.II.
93 Ibid., Wa-2.6 and Wa-2.7.
94 Ibid., Wi-1 and Wi-2.

for adaptation consulting.[95] A cross-cutting goal aims to develop a national adaptation framework for World Heritage areas by 2030.[96]

In South Africa, the new Climate Change Act,[97] when fully commenced,[98] will regulate mitigation and adaptation under one national law. The CCA aims for an 'effective' climate change response aligned with national development goals,[99] but effectiveness is not defined.[100] CCA principles such as integration[101] and best-available science[102] indicate the legislature's intentions,[103] but in contrast, the global goal on adaptation is adopted verbatim, using defined terms.[104] In substance, the CCA requires integrated adaptation planning by municipal,[105] provincial,[106] and national[107] spheres of government. All spheres must consider climate risks across governance and decision-making,[108] as well as regularly consult other spheres[109] and the public.[110]

The CCA envisages a nationally coordinated, cooperative approach. The national sphere must determine: (1) national adaptation objectives, (2) indicators for measuring progress, and (3) a deadline for incorporating objectives into all relevant national plans.[111] The national sphere must also develop adaptation scenarios over the short, medium, and long term.[112] None of these time spans are defined. The scenarios must: (1) be based on best available science, (2) include monitoring and early warning systems, (3) consider potential climate im-

95 Ibid., Wi-0.3.
96 Ibid., Ü-4. Hamburg's port is bookended by the Wadden Sea and Speicherstadt World Heritage sites.
97 Climate Change Act 22 of 2024 (CCA).
98 National Government Gazette No. 52319, 17 March 2025, pp. 3–4.
99 CCA Aim.
100 Cf. ibid., Recitals para. 6; s 3(i).
101 Ibid., Recitals paras 3(c), 7; ss 2(a), 3(a), (e), (k).
102 Ibid., (h).
103 Ibid., s 3.
104 Ibid., ss 1,2(b).
105 Ibid., ss 7, 9, chap. 3.
106 Ibid., ss 7–8.
107 Ibid., ss 10–11, 15, chap. 4.
108 Ibid., s 7(1).
109 Ibid., s 31.
110 Ibid., s 32.
111 Ibid., s 19.
112 Ibid., s 20(1).

pacts, and (4) contain available adaptation options.[113] National objectives and scenarios must be updated 'periodically'.[114] Various stakeholders, including the Presidential Climate Commission[115] and interest groups,[116] may advise on the national adaptation response.

Adaptation must be coordinated by a National Adaptation Strategy and Plan (NASP).[117] NASPs are a primary instrument for implementing the CCA and integrate adaptation measures by all government and non-government actors, as relevant.[118] These plans must include vulnerability assessments at various scales and incorporate an implementation plan based on the national objectives and indicators.[119] NASPs must be updated every 5 years, considering: (1) monitoring and evaluation results, (2) technological advances, (3) best available science, and (4) international law.[120] Once any NASP is finalized, sectoral plans must be developed, including for the state-owned port sector,[121] and updated every 5 years.[122]

The CCA sits atop various existing plans and policies. The National Climate Change Response White Paper (NCCRP)[123] called for integration of climate change across all government spheres[124] and continual assessment of harbours and coasts.[125] The NCCRP established three planning horizons: short-term (5 years); medium-term (20 years); and long-term (~40 years). Then came the National Climate Change Adaptation Strategy (NCCAS).[126] It sets out 4 strategic objectives, 12 guiding principles, and 9 strategic interventions linked to 12 strategic outcomes.[127] None are specific to the port sector, nor to relevant

113 Ibid., s 20(2).
114 Ibid., ss 19(2), 20(3).
115 Ibid., s 10.
116 Ibid., ss 7(2), 9(4), 10, 11(3), 12(2).
117 Ibid., s 21(1).
118 Ibid., s 21(4).
119 Ibid., s 21(5).
120 Ibid., s 21(3).
121 Ibid., sch. 2.
122 Ibid., s 22.
123 Republic of South Africa Department of Environmental Affairs, 'National Climate Change Response White Paper', 2011.
124 Ibid., pp. 13–15.
125 Ibid., p. 23.
126 Republic of South Africa Department of Forestry, Fisheries and the Environment, 'National Climate Change Adaptation Strategy', 2019.
127 Ibid., pp. 21–24.

state-owned authorities. The NCCAS adopted different planning horizons: short-term (1–3 years), medium-term (4–10 years) and long-term (>10 years). Finally, while other national plans have called for sectoral adaptation strategies since at least 2011,[128] there are still no port adaptation plans.

Subnational level

The Constitution of the 'Free and Hanseatic' City of Hamburg recites how, as a world port city, Hamburg has a special responsibility, bestowed by its history and geography, to the German people.[129] Today this responsibility is outsourced to the HPA and private terminal operators, under city control.

As a city-state, Hamburg has a special dual status, which gives it broad lawmaking power. One law it has enacted is the Climate Protection Law (HmbKliSchG);[130] though mitigation-focused, it also imposes the obligation for all city planning and decision-making processes, including those of the HPA, to consider adaptation and cooperate on adaptation goals.[131] Hamburg's first standalone climate adaptation strategy[132] implements both the local HmbKliSchG[133] and the federal KAnG.[134]

The federal KAnG requires that states prepare climate risk analyses at appropriate scales.[135] The analyses are used to develop a state's precautionary climate adaptation strategy. A state PCAS must adopt an interdisciplinary, integrated approach and include public participation.[136] State planning must involve: (1) data collection, (2) climate risk analysis, (3) identification of overarching strategies, (4) development of implementation measures and indicators,

128 Republic of South Africa Department of Environmental Affairs, 'National Strategy for Sustainable Development and Action Plan', 2011, pp. 33–34; Republic of South Africa National Planning Commission, 'National Development Plan 2030: Our Future – Make It Work', 2011, pp. 53–54.

129 Verfassung der Freien und Hansestadt Hamburg vom 6. Juni 1952 (HmbBL I 100-a), zuletzt geändert durch Gesetz vom 5. März 2025 (HmbGVBl. S. 264) Präambel.

130 Hamburgisches Klimaschutzgesetz (HmbKliSchG) vom 20 Februar 2020 (HmbGVBl. S. 148).

131 Ibid., §§1–2, 5.

132 LT-Drs 22/18165, Strategie zur Anpassung Hamburgs an den Klimawandel, 25.02.2025 (State PCAS).

133 HmbKliSchG §5(1).

134 KAnG §10.

135 Ibid., §§2, 10.

136 Ibid., §10(1)–(2), (4).

and (5) monitoring and reporting mechanisms.[137] A state PCAS must be updated every 5 years,[138] and states must also send reports on their local and state adaptation measures to the federal level, consistent with the EU Climate Governance Regulation.[139]

Hamburg's first state PCAS follows the KAnG procedure. It relies on various climate risk analyses and emphasizes the continual improvement of this data.[140] To that end, Hamburg is developing a new climate information system, including real-time monitoring, across eight fields of action.[141] The state PCAS establishes overarching policies across 11 fields of action, including transport infrastructure, utilities, and disaster protection. On transport, the state PCAS aims to safeguard transport infrastructure during extreme events,[142] identifying two highly relevant port climate risks: storm flood impacts on port railways, and sedimentation causing loss of harbour water depth.[143] The state PCAS proposes various implementation measures, with the HPA responsible for the port railways.[144] On utilities, the state PCAS calls for cooperation to ensure the port's commercial water supplies.[145] On flood protection, the state PCAS acknowledges the many private interests in port land located in front of the dyke line and new laws proposed to reform private flood protection.[146] Finally, on disaster protection, the state PCAS says it is essential to maintain critical infrastructure functionality.[147] Ahead of the critical infrastructure regulations discussed above, the state PCAS calls for private operators to adopt a cross-cutting and all-hazard approach, focused on physical protection.[148]

In contrast, the provincial sphere of government in South Africa is relatively weak compared to national and local spheres (Fuo et al., 2022: 66). The national CCA requires provinces to prepare 'needs and response assessments',

137 Ibid., §10(3).
138 Ibid., §10(6).
139 Ibid., §11. See also (n 75).
140 State PCAS (n 181) pp. 21, 23, 27–28.
141 Ibid., pp. 18–19.
142 Ibid., p. 47.
143 Ibid., pp. 47, 50–51.
144 Ibid., p. 50.
145 Ibid., p. 65.
146 Ibid., pp. 69–70.
147 Ibid., pp. 61–62, 74–75.
148 Ibid., p. 61.

with integrated implementation plans, every 5 years.[149] The assessments must: (1) identify response options, (2) analyse relevant regional or local climate risks, (3) identify and spatially map regional or local risks, (4) be based on best available science, and (5) identify measures and mechanisms for implementation.[150] Meanwhile, the implementation plans must: (1) be informed by the needs and response assessment, (2) include measures commensurate with constitutional competencies, and (3) comply with any national requirements or technical standards.[151] These provincial assessments and plans must be integrated with other relevant planning regimes.[152]

Western Cape Province has previously prepared climate risk analyses and a climate policy.[153] Through disaster risk planning and coastal risk assessment,[154] the policy aims to reduce climate risks while increasing resilience.[155] The provincial policy anticipates intergovernmental climate forums,[156] biennial monitoring reports, and harmonization with other relevant reporting protocols,[157] to be established by the national CCA.

Local level

At local levels, the KAnG requires preparation of 'climate adaptation concepts'.[158] These concepts follow a similar design pattern to state PCASs, based on localized climate risk data.[159] Hamburg has no constitutionally recognized subunits, so local administrations (*Bezirke*) are not obliged to prepare concepts, yet Hamburg's state PCAS indicates all are doing so.[160]

The HPA is a public law body under city-state control. As such, it must cooperate towards the goals of the HmbKlimSchG and the state PCAS. Hamburg

149 CCA s 17(1).
150 Ibid., s 17(2).
151 Ibid., s 17(3).
152 Ibid., ss 17(4)–(5).
153 Western Cape Government Department of Environmental Affairs and Development Planning, 'Western Cape Climate Change Response Strategy: Vision 2050' (WCCCRS), First revision, March 2023.
154 Ibid., p. 18.
155 Ibid., pp. 16–19.
156 Ibid., pp. 26–27.
157 Ibid., p. 30.
158 KAnG §12(1).
159 Ibid., §12(2)–(6).
160 State PCAS (n 181) pp. 24–25.

has a Port Development Plan 2040, with limited adaptation measures, and the HPA issues biennial sustainability reports. A previous case study even analysed climate adaptation implementation in the port (Koppe et al., 2012). Despite all this, the HPA has no port adaptation plan.

Meanwhile, in the South African system, Cape Town is a powerful, Category A metropolitan municipality. Nevertheless, the CCA imposes the same requirements on municipalities as it does in the provincial sphere to prepare needs and response assessments and integrated implementation plans.[161]

Cape Town conducted a comprehensive climate risk analysis in 2019.[162] The analysis notes there are few studies about climate impacts in South African harbours, but Cape Town's harbour was excluded from its own analysis because of the gazetted port area.[163] The city also has a climate change strategy[164] and a more specific Climate Change Action Plan (CCAP).[165] The CCAP calls for comprehensive risk mapping and more cooperation.[166] It aims to mainstream climate adaptation into city plans[167] and uses multiple planning horizons: existing, short-term (1–2 years), medium-term (3–5 years) and long-term (>5 years).[168] These current adaptation plans could readily be adapted to meet the new CCA requirements for assessments and implementation plans.

However, the CCA also requires that municipal adaptation plans be integrated with other relevant planning regimes.[169] This will be more difficult, with no national port adaptation plan and current city plans pointing to key gaps. For instance, the CCAP identifies climate risks to coastal infrastructure,[170] yet does not mention cooperation on harbour development with Transnet.[171] In contrast, the city's Integrated Development Plan commits to intergovernmental cooperation on port connectivity and suggests the city monitor and assess

161 CCA s 17(1).

162 OneWorld Sustainable Investment, 'Elaboration of a "Climate Change Hazard, Vulnerability and Risk Assessment" Study to the benefit of the City of Cape Town', 2019.

163 Ibid., p. 27.

164 City of Cape Town, 'Climate Change Strategy', 27 May 2021.

165 City of Cape Town, 'Climate Change Action Plan', 28 September 2021 (CCAP).

166 Ibid., pp. 45–51.

167 Ibid., pp. 93–97.

168 Ibid., p. 134.

169 Ibid., ss 17(4)–(5).

170 CCAP (n 214), pp. 17–18.

171 Cf. cooperation on rail infrastructure: ibid., p. 78.

infrastructure risk.[172] Meanwhile, the city's Disaster Risk Management Plan refers to multiple climate hazards[173] and includes a specific city contingency plan for ship incidents.[174]

Three contingencies enabling and constraining port city adaptation planning

This section considers the question: How do emerging climate adaptation governance frameworks enable and constrain planning for climate risks in port cities? The discussion proceeds by returning to the three senses of contingency introduced earlier and considering how these contingencies affect planning professionals, at the city level, confronted with uncertain climate futures.

Spatial contingency

As a threshold proposition, governance frameworks constrain futures through their underlying assumptions and boundary conditions. These are often exposed to productive critique whenever misalignments are observed between different spatial borders, as often occurs in governance studies (Tocco et al., 2024). This is also observed in both case studies. In Hamburg, the port and territorial sea are state responsibilities, yet the River Elbe is a federal waterway. Meanwhile, in Cape Town, national laws arbitrarily remove the harbour from municipal planning controls. Other misalignments are observed more abstractly. Since 1994, UNCLOS has determined that territorial seas belong to coastal states, building jetties of legal principle that extend the prevailing system of international law, grounded in territorial sovereignty, into the categorically different marine realm. Similarly, the GCoM network between cities lies outside international law, where traditionally only nation-states interact. The systemic implications are profound. Such spatial misalignments invite planning professionals to imagine how entire systems could be different.

172 City of Cape Town, 'Five-Year Integrated Development Plan: July 2022–June 2027', 2022, pp. 54, 100.

173 City of Cape Town, 'Municipal Disaster Risk Management Plan', July 2015, p. 38.

174 Ibid., p. 8.

Conditionalities and dependencies within prevailing legal and political orders

Now looking *within* the prevailing governance systems, the legal hierarchy substantially determines planning professionals' official capacities to shape the future. Once again, Table 1 summarizes the legal and policy hierarchies compared earlier and now discussed here.

In this comparison, it appears Hamburg sits within a generally more integrated legal order than Cape Town. While the effectiveness of these regimes is beyond the scope of this comparison, other literature suggests that there is still more work to do. Despite repeated calls for integrated planning approaches, a significant problem in Hamburg remains sectoral institutional logics, siloed thinking, and budgeting (Hanf et al., 2024: 108). Meanwhile, despite strong intergovernmental cooperation in South Africa, substantial practical challenges remain, including 'ageing municipal infrastructure, inadequate resources, rampant corruption, and limited capacity' (Fuo et al., 2022: 64). These implementation and effectiveness issues could be further investigated in future research, particularly in interviews with stakeholders.

National constitutions substantially determine which levels of government play a role in shaping port city futures. In Germany, states have primary authority over their territorial development, including both cities and ports. Here, Hamburg's dual city-state status is decisive. In South Africa, the municipal sphere has primary authority over most local planning, including coastal infrastructure, except ports, which are controlled by the national sphere. Although South Africa's Constitution has strong intergovernmental cooperation obligations, this is another example of a 'highly fragmented' regulatory framework in that country (Fuo et al., 2022: 69).

Privatization complexifies planning for port city futures. Both case studies involve the same 'landlord' model of port governance, albeit under different ownership structures. In Hamburg, the city controls the landlord and the main private terminal operator. In contrast, Cape Town has no ownership of either the landlord or the terminal operator entity; both are currently held in national ownership. While this persists, intergovernmental cooperation is required, but local influence could be further alienated in future, if port privatization proceeds as envisaged in the AU Charter. Moreover, as a consequence of splitting ownership and operational control, there is a bifurcation of planning focus on climate risks. While the landlord owner looks to the long-term robustness of port infrastructure, the terminal operator looks to short-term commercial im-

pacts on port performance. In short, port privatization has diluted local control in both cases, albeit with more direct control retained in Hamburg than in Cape Town.

Constitutions and ownership are relatively coarse legal controls, while other laws and policies are more granular. Lawmaking is a dynamic process, with new laws and policies emerging all the time. This is demonstrated by the new national framework laws for climate adaptation planning. In both cases, these framework laws impose a similar general requirement: All public authorities must consider climate adaptation in their planning and decision-making. Note that neither law creates more substantive legal rights or obligations, with the legislation overwhelmingly procedural in nature, as anticipated by legal theory (Ruhl and Salzman, 2013: 1017–19). This severely limits the ability of individuals or civil society organizations to bring litigation to enforce the stated goals of climate adaptation. However, other forms of public participation are envisaged, such as in developing overall strategic direction, planning policies, or implementation.

Aleatoric contingency of climate risk

Having critiqued the system and analysed the prevailing order, this part looks to the future and considers the existing system's capacity to meet the exigencies of climate risk.

Across levels of governance, both case studies show the same abstract design pattern for climate risk assessment and adaptation planning. That pattern is an iterative cycle: Assess vulnerability > Strategize at a high level > Identify specific actions > Monitor and evaluate > Reiterate. The pattern recurs across governance levels, from the global goal on adaptation, international standards,[175] and GCoM, to the national adaptation laws and various plans. It now appears systemically entrenched. But even prevailing orders are capable of reconfiguration. Given that neither case study has adopted a port adaptation plan and in light of new impetus[176] to do so, this appears to open up a compelling new opportunity for innovation by planning professionals.

To that end, recent decades have seen the development of 'adaptive port planning' (APP), a promising way of approaching long-term infrastructure

175 E.g. International Organization for Standardization (ISO) Standard No. 31000:2018 (Risk management – Guidelines).

176 2024 German Ports Strategy; CCA s 22.

planning in ports (Taneja, 2013; Notteboom et al., 2022: 511–15). The basic steps in APP dovetail with the established iterative cycle above but further particularize two steps: identifying specific actions, and monitoring and evaluating. At the point of identifying actions, APP calls for even more detailed articulation of different *kinds* of action: whether shaping, mitigating, hedging, or seizing actions. Each of these four types of action represents a different response to changing conditions between iterative cycles of updates to a plan (Taneja, 2013: 97–100). Meanwhile, the monitoring system envisaged in APP is based on 'signposts' or triggers, also grouped in four categories: defensive, corrective, capitalizing, and reassessment triggers. The four categories describe how the basic plan must change in light of the trigger being reached, whereupon a corresponding 'contingency plan' is also triggered. These more detailed steps in APP could readily be accommodated within the established iterative cycle and new national adaptation laws. Alternatively, emerging critical infrastructure regulations could also offer a basis for the use of APP methods. While some pilot studies of APP in practice exist (Taneja and Vellinga, 2018), more could be conducted under these new and emerging legal frameworks. Future work could then also investigate the practical hurdles to wider uptake of APP in port adaptation governance.

Conclusion

This chapter contributed a comparative law perspective on climate adaptation planning in port cities. Analysis of the multilevel law and governance frameworks for climate adaptation in two case studies, Hamburg and Cape Town, revealed highly fragmented systems in both cases. This analysis suggests port city adaptation planning remains 'all at sea' for now. Although new national laws and recently established design patterns for integrated adaptation planning hold at least the promise of 'safe anchorages' in future, more ports need to prepare and implement standalone adaptation plans amid a coming storm of climate impacts.

The multilevel analysis provided a basis for discussion centred on how three contingencies in port city governance enable and constrain planning professionals in shaping port city futures. The ultimate effects of these contingencies can be summarized as follows:

1. Under the currently prevailing legal orders, planning professionals in Hamburg have greater port planning power and agency than their counterparts in Cape Town.
2. In both cases, privatization means that planning professionals must cooperate across institutional barriers and somehow bridge the divergent short- and long-term planning foci of different port management entities.
3. In both cases, new national framework laws for climate adaptation planning require planning professionals to consider national climate adaptation goals in their decision-making. Otherwise, the new national laws are predominately procedural in nature.
4. In practice, planning professionals are bound by more detailed obligations contained in ISO professional standards and are likely to follow relevant technical guidance from bodies like PIANC.
5. Under the currently prevailing legal orders and within broadly established design patterns, planning professionals could experiment with new approaches such as APP.

That said, planning professionals have agency within any prevailing legal and political order. Both case studies demonstrate how the dynamic process of lawmaking, which exposes discrepancies between new planning policies and the established legal order, opens up new opportunities, where planning professionals can be active agents of change. This is seen in various climate plans and policies that *preceded* the national framework laws, including the GCoM reporting framework and certain national climate policies. For example, GCoM's robust climate adaptation planning and reporting framework emerged in 2019. This was after the Paris Agreement but before the UAE Framework and national adaptation laws. In the meantime, GCoM's reporting framework could be seen as a city-led innovation in the absence of national leadership.

Similar innovations were seen at other levels. Germany's 2021 national climate risk analysis adopted the basic 'cluster' pattern that was subsequently legislated in the KAnG. Likewise, planners made repeated calls for integration and mainstreaming in South Africa's 2011 NCCRP, and in Cape Town's 2019 risk assessment and 2021 CCAP, as subsequently enacted in the CCA. Conversely, some policies remain too far ahead of their time. Germany's 2022 resilience strategy has not achieved a national system of cross-cutting, all-hazard planning for critical infrastructure. Nor has the 2024 port strategy led to individual port adaptation strategies. Likewise, South Africa has not seen the cooperation, particularly on coastal and harbour risk planning, repeatedly called for in

national, provincial, and municipal planning documents. Nevertheless, these discrepancies between law and governance herald opportunities for change, enabling planning professionals to reshape the system towards (or away from) different possible futures.

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15. Contingent unsustainable urban futures in São Paulo's peripheries[1]

Ana Paula Koury and Alessio Mazzaro

Introduction

Between 1960 and 1980, São Paulo experienced an astonishing growth, with the urban population increasing from 3,7 to 8,4 million of inhabitants (IBGE, 1996) making it the largest urban agglomeration in South America. The low-income population was drawn to the city's economic strength and found housing in peripheral areas, often in large housing complexes or informal settlements characterized by clandestine subdivisions. In the absence of public policies capable of meeting their needs, residents directly addressed the lack of housing through self-managed initiatives or a collective action system (*mutirões*), increasing the presence of informal settlements.

In informal urbanization, contingency is the rule rather than the exception – unlike in cities governed by formal planning, where order and predictability are expected. Yet, rather than being an anomaly, informal urbanization prefigures the contingent scenarios that many cities increasingly face as they must act and adapt under conditions of uncertainty and under more fragile social pacts. The goal, however, is not to compare the vastly different urban conditions produced by specific contingencies, but to learn from the ways that con-

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tingencies – understood as unpredictable, unexpected, and unregulated situations – trigger conflicts and contradictions that shape urban processes. In the peripheral areas where informal settlements have developed, these contradictions are made visible through the conflicting operational modes that are locally in play. Engaging with the case study of Torresmo, a small community within Itaim Paulista, in eastern São Paolo, we aim to offer valuable insights into the challenges of how cities grow and function amidst complexity arising from facing contingent and uncertain futures. In the peripheries of São Paulo, where most of the city's informal settlements are located, the design and making of infrastructures are primarily shaped by entanglements between the municipality and construction companies, whose technical culture contrasts with emerging visions for a more sustainable urban future.

In particular, this chapter examines how interventions into an informally urbanized context both face and engender specific local contingencies – on top of the inherently contingent nature of development. It notes how a major disaster has enabled emergency interventions outside existing regulatory rules, thereby primarily supporting the benefit of local construction firms. We ask how and to what extent the method of a 'real-world laboratory', translated from a Global North context, can relate to these local contingencies and possibly open up leeway for more progressive agendas.

Starting from elements of planning theory to set out the various theoretical lenses, an outline on reflexive modernity where technicians set the planning agenda, and a discussion of peripheries to question order as the main aim of cities in the Global South, the chapter then introduces the area in which the community of Torresmo is located, as well as Lab Itaim, a real-world laboratory that operates there. From there, analysis delves further into the case study, presenting the contingencies of the emergency infrastructure and the processes involved. Finally, conclusions are drawn from the experience of Lab Itaim in Torresmo, which served as a testing ground for what is known as the real-world laboratory method, within the context of Brazilian political culture and informal urbanization.

The diverse analytical lenses we discuss in the theoretical overview help us grasp the periphery as a historical reality that has happened in Brazil since the sixties and simultaneously challenge both modernity and morality in planning theory. Real-world laboratories serve as a counter-ideology to modernity, rejecting the scientific anticipation present in models without rejecting science itself. Instead, they strengthen the empirical foundation of the scientific method, creating opportunities for society to negotiate its common future.

This chapter aims to bring together various theoretical lenses and a case study to explore potential paths for the future of cities.

Theoretical context

Reflexive modernity, climate change, and securitization of nature

As Raquel Rolnik (2022: 107) wrote, reflecting especially on São Paulo, 'we built cities that eternally condemn us to consolidate the precarious'. This request for continuous adaptation, if placed in the context of climate change, aligns with the concept of 'reflexive modernity' discussed in planning studies by Simin Davoudi (2014) and then recalled by Lizzie Yarina (2024: 156), in which a society is organized around the risks of its own making. Reflexive modernization is a concept initially introduced by Ulrich Beck, Wolfgang Bonss, and Christoph Lau (2003) as a shift in late modernity to a world that is increasingly organized around government's ability to manage individuals' perceptions of risk (Beck, 2015) and where progress is achieved through reorganization, optimization, and adaptation.

For Davoudi (2014), the manipulation of nature that was enacted by modernist planning and engineering, which aimed to fit nature to our purposes and free us from its hazards, led to a greater demand for security. Furthermore, she argues that in recent years discourses of climate change and fear of uncertainty have led to greater belief in technical knowledge, favouring risk-reduction-based approaches to environmental issues. Risk is perceived as calculable and controllable by technical experts through modelling, so these experts become the people who define agendas. In this regard, Maarten Hajer (1997: 73–103) talked of an 'ecological modernization' where environmental degradation is imagined as calculable and it is assumed that society can become more sustainable through technological and institutional changes while maintaining economic growth.

Reflexive modernity,[2] while actually implying the collateral damage of rational modernity, had as its consequence – ironically – the affirmation of the 1960s view of urban planning as 'a technical-rational decision-making process' and 'a reluctance to imagine places that do not yet exist' (Davoudi, 2023: 2281–83; 2014). In the context of flooding risks, Yarina (2024: 1) similarly wrote of hydraulic epistemology, 'an ideological assumption that experts can govern nature and manage risk through modernist abstraction'. In particular, she criticized the 'fashionable effort to reframe nature as modellable' because, as she argued, models maintain a degree of uncertainty in replicating the complexity of the atmospheric systems (Yarina, 2019: 149–50).

Similarly, (hydraulic) infrastructures, networked systems replicable by experts to control nature and ensure regular, predictable flows, are facing great socioecological uncertainty. Stephanie Wakefield (2018) proposed to reimagine them in a way that embraces unpredictability, and Mary Lawhon et al. (2022), through the example of mobile pumps used as a strategy to manage uncertain flood risk and not as an emergency procedure, talked of the emergence of a more fluid and flexible concept of infrastructure, an infrastructure that has a more dynamic and less predictable scalar and spatial character. In this infrastructural panorama, urban planners act as mediators of stakeholders, and their agency varies based on the institutional and socio-material context in which they operate. Furthermore, their possibilities of influencing how an infrastructure is planned, made or imagined are constrained by neoliberal governance and corporate interests in a given territory (Graham and McFarlane, 2014).

Rethinking modernity from and with the peripheries

Acknowledging some of the developments in planning theory that have happened in the last two decades, it appears that the objective of contemporary cities may no longer be the creation of order, as it was for modernist planning. Such perception becomes even clearer if the discussion is situated in the Global

2 Ulrich Beck wrote in *Risk Society* (1992: 19) that we are in a new phase of modernization where the 'production of *wealth* is systematically accompanied by the social production of risks'. Beck's reflections were made through a distinction between hazards that occur 'naturally' and risks as events linked directly or indirectly to human action – such as the modernist regularization of nature (Beck, 2012: 13–15). Subsequently, concerns about risk produced the desire for security – as the neutralization or avoidance of risk – leading ironically to the desire for a greater rational control of nature (Davoudi, 2015).

South and megacities such as São Paulo. Nowadays, spatial planners need to design cities in ways that face urgent issues such as spatial inequalities, affordable housing, social conflicts, migration, and climate change. Although planners aspire to fulfil these tasks, competing contingencies seem to arise: In the intrinsically contingent context of informal urbanization, these planners encounter another contingency, namely the enduring belief held by some actors in imposing an idealized order onto the city. This order may rely on morphology as well as perfect synergies between space, infrastructure, society, and nature, but also on the belief that a definite and precise future can be planned in a 'chosen' place. While this 'positivist thinking', as Davoudi (2012: 430–32) called it, still holds a dominant position in European planning, a more interesting idea for this chapter is one anchored in the Global South, of planning as the urban practice of negotiating with the future (Roy, 2005).

At the beginning of the 2000s there was a call to situate the production of theories and policies on how cities function in the Global South. This was due not only to the inappropriateness of Western theories in studying and explaining megacities in the developing world but also to a desire to start learning from the urban transformations of cities like Rio de Janeiro, Mumbai, Jakarta, and Johannesburg (Roy, 2005). Following this path, it is important to accept Ananya Roy's (2005; 2009) advice that planners should learn how to work with states of exception and to introduce the ideas of European planners who lived in and learned with the Global South, such as Otto Koenigsberger in India in the 1950s and John F. C. Turner in Peru in the 1960s. Their contributions aimed to address the challenges that these places face, including intensive urbanization in depressed economies across different climate zones and cultures.

In Brazil, the earliest institution to address peripheral urban phenomena was the Brazilian Centre for Analysis and Planning (Centro Brasileiro de Análise e Planejamento, CEBRAP), created in 1969 in São Paulo. In that same period, Sérgio Ferro and Rodrigo Lefèvre were studying the large settlement of Cubatão, located near the Port of Santos – a city outside São Paulo. They realized that most dwellers owned their houses. It was a surprise to them: Either the Cubatão favela was the only place in the country where redistributive urban reform had been secretly implemented, or there was something to be understood about the role of informal dwelling in Brazilian capitalism. In 1972, this research provided Francisco de Oliveira , one of the members of CEBRAP, with the empirical basis to propose a model of the peripheral capitalist economy in Brazil (Lara and Koury, 2022: 103–08). For de Oliveira, there was no duality between backwardness and modernization in Brazil, but rather an organicity.

The dynamic growth of the Brazilian economy during that period was based on rural principles of a subsistence economy, in which the self-production of housing, often through unpaid overwork, depressed workers' wages while allowing the pattern of economic accumulation to intensify. Nabil Bonduki and Raquel Rolnik (1979: 128–29) later questioned de Oliveira's conclusions, arguing that when workers build their homes, they produce an exchange value in the housing market that they can later use. Furthermore, analysing the role of the state in the production of subdivisions, Bonduki and Rolnik (1979) provide valuable clues for understanding the making of peripheries and informality at different political moments in Brazil. Following their work, it can be said that when the state fails to mediate the relationship between capital and labour, the informality and self-production of housing become a loophole that allows the system to accommodate the over-exploitation of labour in an ideology of 'freedom'.

However, a second position in this discourse can be drafted, which sees the state as having a conscious role in the production and demand for informality. In 'Urban Informality: Toward an Epistemology of Planning', Roy (2005) wrote that informality is a mode of urbanization produced by the state and not by the poor. In a later text, she stated it was an 'integral part of the territorial practices of state power' (Roy 2009, 84). The state does not fail to mediate the social dynamics of space production; rather, it is complicit in them. Realizing this also means going beyond a strict distinction between formal and informal that, as Colin McFarlane (2019) wrote, often constrains our understanding of urban processes.

Thinking with the peripheries, informality can be understood as a condition that is not completely regulated by state bureaucracy but is instead mainly produced through collaboration and the needs of inhabitants. As Judith Innes, Sarah Connick, and David Booher (2007: 198) wrote, the planning strategies of the inhabitants imply casual and spontaneous interactions and are 'neither prescribed nor proscribed by any rules'. This view paves the way for a non-moralizing vision of informality and land occupation (Jacques, 2001), or, in other words, to a positive view of contingency. In a *peripheral thinking*, the appropriation of space through irregular land ownership is part of the process of making housing affordable, even when this process is entangled in capitalist production: people occupying at-risk areas to build shacks and then rent them out to gain a living from others. The necessity of using spaces outside of the law, and in ways that people need, is situated alongside what Sara Ahmed (2019: 213) called *queer use*: 'how things can be used in ways other than for which they were

intended or by those other than for whom they were intended'. This opens a discussion between the proper use of space – its function defined through state bureaucracy, technicians, and planners – and its 'improper use', the one made by the inhabitants. As Melanie Lombard and Paula Meth (2016) wrote, by asking how and why a practice is considered informal, it is possible to understand how planning and governance in a place really work.

The real-world laboratory: A path for sustainable peripheral transformation

Experimental modes of governing urban change have attracted major scholarly attention over the last 15 years. Phrased as the 'experimental city' (Evans et al., 2016), 'urban living labs' (Bulkeley et al., 2018) or, in the German context, 'real-world laboratories' (RwL), these modes comprise transdisciplinary urban research methodologies that integrate science and society to promote sustainable urban development and transformation. Unlike traditional research, RwLs operate directly in real contexts, actively involving researchers, practitioners, and the community in the search for viable solutions to complex urban challenges (Schäpke et al., 2018). According to authors on the topic (e.g. Schneidewind et al., 2016; Schäpke et al., 2018; Wanner et al., 2018), RwLs are characterized by five central aspects: (1) contributions to transformation by integrating different actors in order to enact the solutions agreed upon among them; (2) experimental methods adopted through interactive strategies to propose and test urban solutions; (3) transdisciplinary research integrating academic and practical knowledge to address real-world problems; (4) scalability and transferability of results from the local experiment, allowing for broader applications in different contexts, and (5) social learning and reflexivity.

Inspired by model implementations in German contexts, the real-world laboratory of this case study was used in Itaim Paulista, a subprefecture of São Paulo, not merely as a research method but as a tool both to act in place of local governance and to challenge that governance to shift towards deeper democratic processes. Contact with other practitioners of this methodology was established through a collaboration with German colleagues, particularly at meetings of the Klimapolis Research Laboratory – a joint initiative led by the Max Planck Institute for Meteorology, in Hamburg, and São Paulo University.

The first meetings of the Klimapolis Research Laboratory,[3] led by Prof. Guy Brasseur (Max Planck Institute for Meteorology) in 2018, brought a RwL experiment in Lockstedt, Hamburg, to Brazilian researchers (Kohler et al., 2021). This experience provided the opportunity to learn the research methodology and identify its key advantages in the Brazilian context. The real-world laboratory emerged as a viable alternative to prevailing practices in Brazilian urban planning, as it was neither top-down nor bottom-up. Co-design and co-production presuppose horizontality and laterality, offering a meaningful framework for deeper exploration.

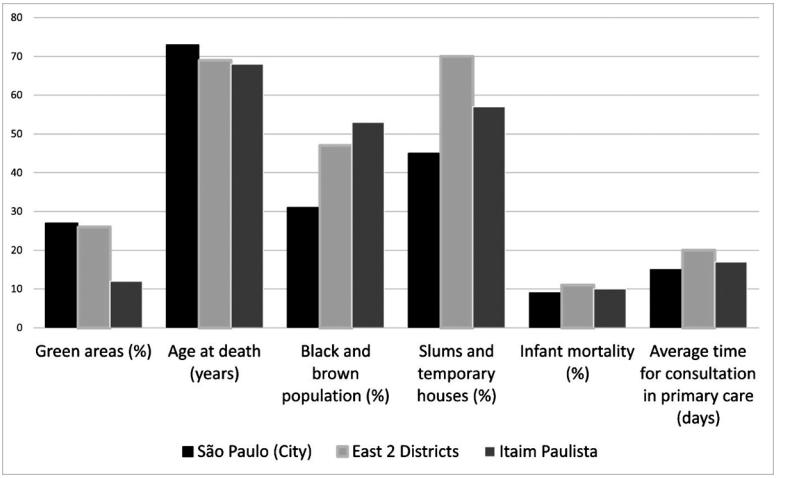
Implementing a real-world laboratory in Torresmo

Lab Itaim Paulista and the geography it enacts

The Itaim Paulista subprefecture is located in the eastern region of São Paulo. It is one of the most populous regions in the municipality, and more than 50% of its area has a population density greater than 40,000 inhabitants per square kilometre. As a result of this over-occupation of land, the subprefecture of Itaim Paulista suffers from a lack of green and public areas, presenting one of the lowest rates of vegetation coverage per inhabitant in the city, which exacerbates the effects of air pollution and contributes to the formation of heat islands (Koury and Cavallari, 2018). Socioeconomic indicators also demonstrate inequalities; compared to São Paolo as a whole, Itaim Paulista has a lower life expectancy, higher percentage of black and brown residents, and significantly greater presence of favelas and informal housing (Figure 1).

3 Funded by the German Federal Ministry of Education and Research (BMBF) from 2017 to 2024, Klimapolis was a long-term German-Brazilian collaboration aimed at developing joint research on urban pollution and climate change in Brazilian metropolitan areas. Its aims were to combine climate monitoring, assessment, and modelling with participatory strategies of urban planning to foster interaction between actors from academia, society, and government to contribute to developing resilient cities. The Klimapolis Laboratory is still an ongoing research project under a Brazilian national network founded by the National Council of Research for Science and Technological Development since 2023.

Figure 1: Comparative socio-economic indicators for Itaim Paulista, the East 2 districts nearby, and the city of São Paolo as a whole.



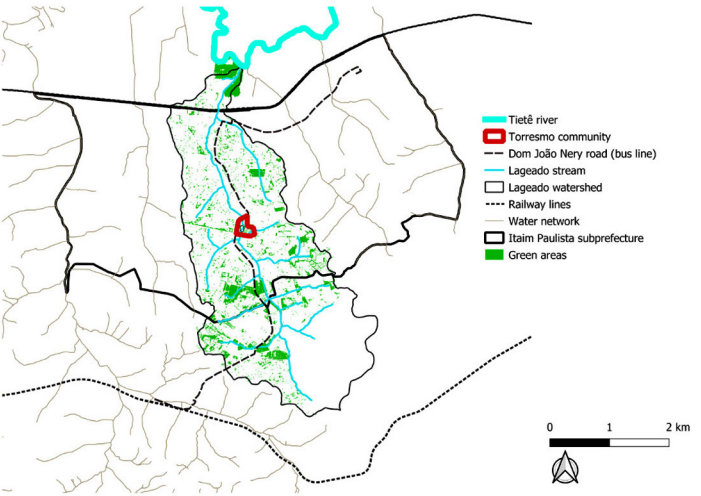
Source: Ana Paula Koury, elaborated with data from the 2024 'Mapa da desigualdade' (Inequality map) by Rede Nossa São Paulo, https://institutocidadessustentaveis.shinyapps.io/mapadesigualdadesaopaulo/ (accessed 5 May 2024).

Added to this picture of social inequality and the over-occupation of land and is the presence of six bodies of water, tributaries of the Tietê river – the largest river in the city of São Paulo, which cuts through the districts of the subprefecture of Itaim Paulista. In the south, towards the administrative limit to the south of the Subprefecture of Itaim Paulista, where dwelling occupations are more vulnerable, there is a large concentration of springs. Furthermore, the sectors with the highest population density are located in sloped areas next to streams, thus at higher risk of flooding (Secretaria Municipal de Desenvolvimento Urbano, 2016).

The Torresmo community is the location where we chose to implement an urban transformation process of transitioning from a precarious urban fabric to sustainable urban development. The goal behind this project is to transform the urban experience of a water-adjacent community frequently impacted by the floods of the Lageado stream (Ribeirão do Lageado) in Itaim Paulista into a sustainable model for São Paulo's peripheral urban development. Torresmo is situated at the midpoint of the basin, at the junction between Dom João Nery road and the Lageado stream (Figure 2). Approximately 200 homes are directly

affected by regular flooding, yet they benefit from the proximity to the road, which serves as a regional mobility axis. The specific conditions of this community and the area it is in form a valuable case study for observing flood impacts in settlements located in high-risk areas as well as the impact of drainage infrastructure.

Figure 2: Location of the Torresmo community in Itaim Paulista, at the junction of the Lageado stream and Dom João Nery road, in the Lageado stream hydrographic basin.



Source: Ana Paula Koury.

Lab Itaim Paulista, coordinated by Professor Ana Paula Koury, has been operating in the eastern periphery of the city of São Paulo since 2015 as a university extension group formalized in December 2016. It adopted the real-world laboratories method (Kraas et al., 2016; Schäpke et al., 2018) in 2018 to trigger urban transformation in partnership with the Klimapolis Laboratory and subprefecture of Itaim Paulista.

A brief history of the community of Torresmo and the area they inhabit

The Torresmo community is a small, informal settlement, also known as a favela, and currently comprises around 200 families. During heavy rains, the houses form a barrier against the water and are hit from two directions: the runoff coming down and the water overflowing from the river. The original nucleus was formed between the end of the 1960s and the beginning of the 1980s, as families from the northeast region of Brazil migrated in search of work and better living conditions. They settled near the Lageado stream in an unoccupied area, when the river was still clean, 'with good water and fish', and they created community ties that continue to this day. This nucleus was consolidated in the 1980s and expanded from the 1990s onwards, as new sectors were added (Silva, 2024).

Torresmo is now made up of four distinct sectors. On the eastern bank of the stream, adjacent to Dom João Nery road, is the original sector. The west one is the first expansion of the community – the second sector – which occurred between the 1980s and the 2000s. In 2003, behind the original sector, a housing complex was built, and the area in front of it was designated for the preservation of the riparian vegetation of the stream (Anelli and Kiste, 2024). In July 2017, the vegetation was removed, and in August, the first informal houses started to appear, forming the third sector of the community. In 2023, the 64 families occupying this sector were relocated to make way for the construction of a large-scale water retention basin. In 2018, the most recent land occupation, by 20 dwellings, of the area close to the Tereza Setuko Koshimae Hatori municipal primary school, on the left bank of the river, formed the fourth sector (Figure 3).

The residents of the Torresmo community have formed neither an association nor an organized leadership (Silva, 2024). However, the two consolidated sectors of the dwelling occupation, the first and second, are mostly regularized, having access to power and running water services. The sewage network connection is relatively recent, having been installed in 2023; however, it still presents many problems due to the poor work carried out by the Basic Sanitation Company (SABESP).

Figure 3: Torresmo community sectors.

Source: Ana Paula Koury; elaborated from satellite image, Landsat/Copernicus.

Building scenarios for urban transformation

Currently, the Torresmo community's most significant problems are the floods. They suffer from inadequate rainwater drainage problems, which exacerbate other issues, such as irregular waste disposal and a lack of garbage collection services in the alleys. The Itaim Paulista subprefecture serves the area, and despite the administrative structure it has in place, the subprefecture lacks the means to handle such a multitude of complex demands. Lab Itaim aimed to support the subprefecture in building a good relationship with Torresmo dwellers and helping them to achieve improvements in their living conditions.

The subprefectures are the smallest administrative units in the city of São Paulo, established during the military dictatorship (1964–1985). They had a subordinate role in the administrative system and, initially, were only responsible for carrying out local maintenance. In 1989, with the popular government of Luiza Erundina (1989–1992), the subprefectures took on a leading role. They become a tool of administrative decentralization and local autonomy, bring-

ing the population closer to the city governance. They would be the political articulators of popular management at the local scale. However, the city council did not approve expanding the powers of the subprefectures, and it was only in 2002, during the administration of Mayor Marta Suplicy (2001–2004), that the subprefectures were implemented as an entire administrative entity, although without full autonomy to plan and develop the city from local perspectives (Correia and Koury, 2021).

The subprefectures have become vulnerable to political clientelism and, in some cases, to administrative opportunism. This has caused invested resources, especially in peripheral regions where local political participation levels are lower, not to be translated into the improvements expected by the population or proportional to the investments made. The case of the emergency infrastructure works in the Lageado stream, which we will report in the next section, was profoundly affected by such political processes.

Lab Itaim was officially established in December 2016. Its members' first official visit to the subprefecture was facilitated by students of the architecture and urban planning course at São Judas University who were residents of Itaim Paulista. Many agreements have been signed since then, with the Itaim Paulista subprefecture, the Secretariat of Urban Development, and the Secretariat of Climate Change. These documents represent a significant political step that enabled academics to gain access to the subprefecture and the Torresmo community more frequently, demonstrating the openness of some administrators at multiple levels of government to establishing new approaches within the system.

Through such agreements, the real-world laboratory can document the local reality through videos, field surveys, and participatory mapping. They also enable the expansion of local technical capacity by providing studies on problem situations, primarily related to drainage and mobility, as well as providing training courses and other forms of capacity building for the technical staff of the subprefecture. One of the outcomes achieved by Lab Itaim was the establishment of partnerships with the State Institute of Technological Research (IPT) to promote the development of community leaders and provide locals with information on hydrological risks and interventions in electrical networks. In terms of field dynamics, we promote productive dialogue between residents and the subprefecture, reducing violent discourse and facilitating residents' proposals of urban improvements through the use of illustrated scenarios.

One of the most significant studies conducted by Lab Itaim, in partnership with the State Institute of Technological Research, was the 2020 hydrological modelling of the Lageado basin. This modelling process involved participation from the administration, residents, and students. As a result, we calculated the impact of urbanization on the flood wave at the mouth of the Lageado stream, combining different types of knowledge to build hydrological scenarios. We also identified a system of open spaces for implementing sustainable drainage solutions distributed throughout the watershed. The scenarios were presented to the subprefecture and the municipal secretariats. The goal was to develop an urban scenario for the Lageado basin that could transform the precarious situation and implement a sustainable urbanization model by adopting nature-based solutions and green and blue infrastructure.

Contingencies of unsustainable futures: The emergency infrastructure works

The heavy rains that hit the eastern periphery of São Paulo at the beginning of 2020 were the first contingency that dashed hopes for sustainable local transformation in the Lageado basin, where the community of Torresmo was expected to be the pilot case study for Lab Itaim. The municipal administration, led by Mayor Bruno Covas (2020) and later by Ricardo Nunes (2021–), opted for an emergency solution in response to the flooding. An emergency solution does not require a project proposal, a bidding process, or the application of participatory instruments mandatory in standard Brazilian urban legislation. It is an exception to allow the administration to respond immediately to emergency losses; in this example, these losses were affecting the low-income population living in flood-prone areas along streams and rivers, which lack adequate infrastructure in the peripheral areas of the city.

The second contingency is that, in some cases, the emergency exception rules also serve as a means for engineering companies to construct substandard drainage works at inflated costs, as they are eager to secure a high rate of capital return; these manoeuvres are possible through political clientelism and administrative opportunism, thereby undermining different levels of administration. Under these two contingencies, the administration's political response placed the solutions presented by Lab Itaim out of reach. The emergency works were presented by the Secretariat of Works and Infrastructure (SIURB) as an unavoidable emergency solution to address the exposure of

peripheral populations to hydrological and geological risks. In the Lageado stream basin, the works were carried out in six critical sections. Authorized in August 2020, December 2021, and March, May, July, and August 2022, the technical solutions for each section varied according to the reported emergency and were not guided by a general drainage plan (Silva, 2024).

The negative consequences of the disjointed interventions, lacking a broader urbanization and drainage infrastructure planning, were felt by all parties involved in the process. The residents were not always satisfied with the interventions, and in some cases, new problems arose as a result of the emergency works. The new administration of the subprefecture in 2023 found itself overwhelmed with new demands for maintaining the area and providing resident support. The Municipal Secretary of Infrastructure was questioned about the unexpected negative consequences and the quality of the works, which varied greatly depending on the contracted engineering company.

Lab Itaim sought to mediate the process by monitoring the works, producing technical reports on the execution of the projects and the building site, and trying to establish contact with the construction company to avoid future problems for the residents. Lab Itaim's involvement triggered an unforeseen element of participation in the emergency works process, which was welcomed by the residents and by the administration's political articulation, which acknowledged the evident mistakes in the ongoing work. In this sense, through intervening in the top-down process and seeking to create openings, Lab Itaim was the third unexpected contingency that operated in the situation.

In Torresmo, the works were contracted in May 2022, and the first construction machine arrived on 29 July 2022. In November of the same year, a landslide directly beneath the Dom João Nery bridge caused the fall of a person passing through the area, which outraged the residents. Fortunately, the person just suffered minor scratches. On the same day, the executing company began depositing U-shaped concrete culverts onto the streambed. The culverts were simply placed alongside each other on the streambed. Three culverts were required to match the channel's width (Figure 4).

Figure 4: The Lageado stream emergency channelization works; infrastructure work on the canal, consisting of three culverts.

Source: Drone survey, Lab Itaim Paulista, July 2013.

The work did not include levelling the riverbed, dewatering, or installing foundations. The culvert pieces were not interlocked, and there was no planning for compatibility with the sewage network or a drainage system to handle rainwater runoff from the slopes. The wall formed by the culverts' profile, which divides the community from the stream, was raised with block masonry. This unstable construction system creates a barrier for the water descending from the slopes, trapping it between the wall protecting the stream's bank and the community, thereby increasing the flooding impact from rainwater, especially in the second sector of the community. In addition, the infrastructure also made it difficult to clean the stream, which now requires cleaning teams to traverse the same path of the stream three times to clean all of the culvert channels.

During the execution of the emergency works, Lab Itaim carried out participatory mapping with the community to identify critical points where it was necessary to integrate micro and macro drainage systems. These maps drew the subprefecture's attention to the need for a sewage system and led to a technical report highlighting the problems encountered during the execution of the work. In an attempt to address these issues felt by the community, the subprefecture carried out a series of complementary works and adaptations to the ongoing project. These unavoidably temporary measures, due to the lack of

compatibility between the work and the related infrastructural systems, further compromised the integrity and impermeability of the adopted structural system.

Although the inspection report that initiated the work in the Torresmo community section, issued in May 2022, characterized the situation as an emergency due to the 'partial collapse of the sidewalk, curbs, gutters, and the carriageway of the arterial road and drainage system […] which poses a risk to […] local pedestrians and vehicles', the work was officially delivered in May 2023 with an unfinished appearance. The risky conditions of the sidewalk and drainage system had not been altered by November of the same year. In the same month of November, just 22 mm of rainfall was enough to flood the second sector of the community; that had never occurred before the works began, even with as much as 40 mm of rain. The city government has invested tens of millions of reais to improve the lives of the Torresmo community, and while the original sector has seen significant improvements in flooding, residents on the other side of the stream have experienced the opposite.

Two major contingencies undermined the jointly designed proposals for a sustainable urban future in a peripheral area of São Paulo: the heavy rains of 2020, and the influence exerted on the city administration from engineering companies that demonstrated a lack of commitment to an environmental agenda. A third contingency, less expected, was the presence of Lab Itaim, whose project monitoring altered somehow altered the trajectory of emergency works in that location, which achieved unexpected visibility. Although Lab Itaim could not implement a new model of sustainable urbanization, its involvement through issuing technical reports and making demands of public authorities undoubtedly shifted the roles and perceptions of social actors within the urban dynamic.

Smaller, day-to-day contingencies – stemming from poorly planned and executed work in the informal settlement – triggered a snowball effect. The drainage and sewage systems had to be improvised, resulting in a cascade of issues for both the subprefecture and residents. The worsening of drainage conditions in the basin sparked widespread dissatisfaction, prompting complaints from residents and scrutiny from the public prosecutor's office. These accumulating issues gradually eroded political support for the project, ultimately leading to a reorganization of the involved actors.

From the heavy rains to the infrastructural solution, Lab Itaim sought to foster connections between the subprefecture and the Torresmo residents. As part of the real-world laboratories method, Lab Itaim avoided a premature or

moralistic judgment about the works in progress. It maintained adequate distancing, giving voice to the actors and feeding the process with systematic documentation and solid information. Technical reports and scientific meetings facilitated the constructive evaluation of the solutions adopted at the building site. At scientific meetings, we promoted the integration of academics, residents, and administrators. Additionally, the project aimed to facilitate the process of social participation by maintaining an open channel of communication between the actors involved, including public actors, residents, and the contracted company, through periodic meetings.

Analysing what happened in Torresmo, it is important to understand that first, the choice of using grey infrastructure in Torresmo instead of small sustainable drainage solutions should be read within the Brazilian approach to city building, characterized by entanglements between the state and construction companies. For many years, the city of São Paulo has had ties of political interests with construction and engineering companies (Millington, 2021; Petrella and D'Almeida, 2017). Second, the channelization of the stream flowing through Torresmo is rooted in a way of thinking that seeks to control and securitize nature. The presence of this grey infrastructure indicates that the primary challenge in implementing a real-world laboratory in Torresmo was the lack of urban policy regulation during emergency infrastructure implementation, leading to sustainable development goals or co-designed solutions not being considered. However, despite this, Lab Itaim was able to capture the attention of the subprefecture and direct it to the needs of the place for which it aspired to propose solutions. Third, the emergency work in the Torresmo community is a material fact that demonstrates the executing company's disregard for construction quality, the contractor, and the residents, as well as the failure of supervision by the Secretariat of Urban Infrastructure, which allowed the delivery of incomplete and poorly executed work.

The contingencies surrounding the emergency work required continuous interaction among local actors, and this linkage was facilitated by the real-world laboratory approach, which aims to establish a co-design situation between the actors in the area. Inhabitants of Torresmo, the real-world laboratory of Lab Itaim, the Itaim Paulista subprefecture, and extra-local actors, including the Municipal Secretariat of Urban Infrastructure and the company responsible for the works, had to interact constantly. The consequences of this interaction constitute a valuable social learning experiment for a number of actors involved in the process. The subprefecture and the Secretariat mediated the works, requiring the companies responsible to justify the result and

consider the observations and technical reports made by Lab Itaim. The Secretariat of Urban Infrastructure began to demonstrate great concern with integrating emergency works into the infrastructure and urbanization planning system. Residents became aware of the technical problems affecting them, enabling them to negotiate effectively with the local government. They stopped using violent communication, formed a leadership group, and elected a community representative to the Itaim Paulista Participatory Council. For its part, the subprefecture approached the Torresmo community by establishing productive communication channels to address local demands.

The works of the Secretariat of Urban Infrastructure were no exception to the rule: Public policies are not prepared to function in informal territories such as the Torresmo community. The contingencies that arise in this situation further exacerbate the problems of an overexploited territory and population, leading to new management and maintenance issues. Informality was a starting point for Lab Itaim's work, an unavoidable reality of urbanization that manifested itself especially through the acceleration of urbanization of Latin American countries.

The great challenge in understanding the informal peripheries was to move away from the moral judgments implicit in the notion of order and modernity, to grasp in-depth the mechanisms that act in the reproduction and management of these political, technical, and social territories – mechanisms which ultimately become more evident when unplanned situations occur.

Conclusions to change the unsustainable urban future in São Paulo's peripheries

The unsuccessful experience of the emergency interventions carried out in the Lageado stream (Ribeirão do Lageado) demonstrates the limits of an emergency response designed without relation to an infrastructure and urbanization masterplan – because punctual intervention that does not consider its effects in the socioecological system in which it enacts. Furthermore, the lack of community participation in the planning of these projects caused harm to all parties involved in the process.

In addition, there is a particular kind of informality in the way in which the emergency infrastructure was built in Torresmo, blurring the distinction between formal and informal. Its dimension of informality comes from the pos-

sibility of not following the rules of Brazilian urban legislation and not being part of a masterplan.

While the agency of Lab Itaim was limited by the culture of governance and corporate interests at the local level, its experience in the Torresmo community allowed for rethinking the integration of sustainability guidelines in São Paulo's urban planning efforts. In particular, the lessons learned from interaction with the inhabitants of Torresmo, the subprefecture, and the secretariat are now being formalized into a cooperation proposal aimed at other areas of informal urbanization in São Paulo. This programme, called Lab Sampa, was proposed in January 2025 to the Municipal Secretariat of Climate Change, aiming to address the major socio-environmental challenges in the city's urban peripheries by expanding infrastructure works. Moreover, building on the experience in Torresmo, the programme aims to facilitate and improve communication between local sectors, residents, and the subprefecture as a strategy to integrate maintenance and urban infrastructure works, thereby enhancing management and public policy services. The objective of opening up alternative paths was not achieved in the Torresmo context, but the lab's function as a third contingency changed governance practice in São Paulo's informal settlements on a broader scale.

Understanding the actors, culture, and local identity, strengthening the subprefecture and local technical capacity, and organizing meetings with local managers and residents were strategic elements for Lab Itaim's work in Itaim Paulista to help expand common visions on the causes of infrastructural problems. These same elements will now be tested through Lab Sampa in other peripheral informal areas of São Paulo. The experimental laboratory method, or real-world laboratory, conceived and tested primarily in contexts of the Global North, faced challenges in the case study discussed in this chapter, particularly in the context of Brazilian political culture and urban informality. And yet, it increased the scope of the method to better deal with non-European contexts and contributed to situate planning thoughts on the test ground of the Global South.

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16. Of contingent waters and fragile futures

Thinking Berlin's looming water crisis through the temporalities of the hinterland

Gala Nettelbladt

Introduction

> Those Brandenburgers, they are so convinced about their lakes in Lusatia. I mean, I have no idea why they are holding onto these plans, but creating an entire lake district with all this surface for water to evaporate is so outdated.

So laments a senior civil servant in charge of Berlin's water management, frowning at us.[1] It is a hot day in June 2025. We meet in her office at Berlin's Department for Urban Mobility, Transport, Climate Action and Environment on a field trip with urban planning students to study the city's strategies to tackle water scarcity. Perplexingly, though, while my students entered the meeting eager to learn about water-sensitive urban design, sponge-city approaches, and planning interventions such as rainwater retention, they were offered a presentation of Berlin's hinterland, Lusatia.

Berlin's future is tarnished by a looming water crisis. As demands for water rise due to the city's population growth, climate-change induced droughts and reduced rainfall have drastically lowered groundwater levels. Another significant yet often overlooked factor contributing to the city's water scarcity is the planned closure of nearby coal mines in the region of Lusatia. A quick

1 Interviews were conducted in German; interviews and non-English quotations have been translated by the author.

1.5-hour train ride east of Berlin, Lusatia has constituted a vital water source for Berlin over the past decades by artificially supplying the river Spree, from which Berlin now extracts most of its drinking water, through discharging groundwater extracted through mining into the river. However, as Germany's coal exit is expecting completion by 2038 at the latest, these artificial inflows are also coming to a halt (Water News Europe, 2025). At the same time, Lusatia is set to become Europe's largest artificial lake district through the engineered flooding of abandoned brownfields – using groundwater and the river Spree. Planned as the Lusatian Lake District (LLD), the region's future of brownfield restoration is imagined as one of lush lakes, where tourism is hoped to fill the economic gap created by the coal exit.

Against this backdrop, the statement by the Berlin civil servant is telling in two regards. On the one hand, it indicates, rather contemptuously, the city's dependence on Brandenburg, the federal state in which Lusatia is partly situated, for water supplies. On the other hand, and more implicitly so, it signals the uncertainty that comes with this dynamic, expressed in a sense of powerlessness against the region's planned vision of the LLD, which, in the Berlin water department manager's mind, will lead to water waste that could otherwise be avoided. Curiously, this uncertainty appears to be rooted in the temporal element of 'outdated' plans, implying that these plans are not 'up-to-date' with contemporary climate change scenarios. Indeed, while plans for the LLD embody the region's hopes for new economic revenues, spatialized through municipal developments of harbour districts and new industries on the lakes, this vision is increasingly made complicated by depleting water availabilities. Lakes are not filling up as quickly as expected. The plans upon which these developments rest date back to the early 2000s. They were based on environmental projections from the late 1990s, which failed to predict the overlapping consequences of mining and climate change–induced water scarcity now characteristic of the region.

Water scarcity is thus introducing a whole enigma of temporal dimensions into the planning of the LLD, not only raising questions about the when and how of this future vision but also precipitating uncertainties and unpredictability about the hydrosocial future of Berlin. While it is increasingly unclear at what speed the lakes will be filled, it is also uncertain when Berlin will run out of water and how quickly measures countering this scenario need to be in place. In this chapter, I want to sit with this enigma, scrutinizing how Berlin's looming water crisis is defined by what I call 'the contingent temporalities of the hinterland', alluding to the specific rhythms of hinterland

shaped by ever-changing, situational, and often uncertain conditions. Specifically, I underscore the plural 'time perceptions' (Hanusch and Meisch, 2022) of this situation, not only tracing how current plans are being complicated by hydrological time but also inquiring into the plural logics of the hinterland's seeming inability to adjust to the rapidly changing context: How do contingent temporalities unfold? What implications do they entail for Berlin's looming water crisis?

To answer these questions, I mobilize debates in urban studies on the contingencies of city-hinterland relations (Brenner and Katsikis, 2020) and bring them into conversation with literatures on hydrological time. Situating my analysis at the junction of these literatures, I attend to two blind spots in discussions on city-hinterland relations. First, as works engaging with city-hinterland relations have offered valuable insights for conceiving of urbanization as a process that is actively supported by non-city spaces and the uncertainties embedded therein, they have paid less attention to its temporal dynamics. Second, while, urban political ecology literature has been of tremendous value for tracing hydrosocial relations and how water scarcity is socially constructed, it has not engaged greatly with water as a temporal factor. Addressing the role of time in the contingent city-hinterland relations between Berlin and Lusatia that are created by water scarcity, I aim to fill this gap. Building on document analysis and interviews with key actors, I argue that these contingent temporalities unfold through three dimensions, namely, diverging visions, delayed predictions, and fragmented responsibilities. Together, they present ambiguous implications for Berlin's future water supply.

The chapter is structured as follows: First, I introduce the conceptual prism through which I examine the contingent temporalities of the hinterland, located at the junction between theories of the hinterland and hydrological time. Subsequently, I present the methodological basis and the context of the case of LLD, before I then spell out my argument about the unfolding contingent temporalities of the hinterland. Finally, I conclude by reflecting upon the fragile city-hinterland futures these contingent temporalities give rise to.

Tracing the contingent temporalities of the hinterland

In order to trace Berlin's water crisis through the temporalities of its hinterland, and the contingencies rooted therein, I connect two bodies of literature in urban studies that have thus far stayed largely apart: discourse on the contingent nature of the hinterland, and on water as temporal factor.

The negative potentiality of the hinterland

Hinterlands – those non-urban spaces that actively support urban life – have long been relegated to the margins of urban theory and urban studies but have seen a recent increase in attention. Stemming from Lefebvrian discussions around the need to dissolve a sharp urban-rural dichotomy (Lefebvre, 2003), such perspectives spell out a multi-scale understanding of urbanization (Brenner, 1999; McCann, 2017) that is by now well-rehearsed. Questioning city-centric approaches to urban analysis, this scholarship conceives of cities as encompassing not only metropolitan regions but also the extended landscapes of primary commodity production. Crucially, these scholars argue that urban processes are materialized within city spaces while simultaneously exceeding them, thus holding that 'the urban problematique can only be deciphered adequately through an approach that systematically connects them [the hinterlands], at once in social, political, material, infrastructural and ecological terms' (Brenner and Katsikis, 2020: 25–26).

In this context, the hinterland has emerged as a specific axiom to describe the non-urban. Given its differentiation and variegation, Pushpa Arabindoo highlights how the hinterland is distinct from the peri-urban, which still relies on the urban, and yet it is systematically connected to the urban as a process mediated through institutional, political, social, and environmental factors (2020: 20). As such, the hinterland is organized around a range of spatial scales: 'an assortment of morphological forms and settlement typologies including the urban, the suburban, the peri-urban, the rural, and even the wilderness' (ibid.). These comprise various types of settlements (towns, villages), land-use configurations (industrial, agrarian, extractive, energetic, logistical), and ecologies (terrestrial, oceanic, subterranean, atmospheric), encompassing supply zones, impact zones, sacrifice zones, and logistics corridors (Brenner and Katsikis, 2020).

Under conditions of climate change, scholars have argued that contemporary hinterlands constitute a territorial form of urbanization that can no

longer be described through the idiom of 20th-century agglomeration processes but must be radically reimagined. Neil Brenner and Nikos Katsikis point out that while the material and energetic flows mediating city-hinterland relations have been studied extensively (see e.g. Ranganathan and Balazs, 2015; Bahers et al., 2020; Bartels et al., 2020), the hinterland itself has remained an enigmatic 'black box' (Brenner and Katsikis, 2020: 26). Consequently, what is taking place inside the box, i.e. how it evolves, its intrinsic political-economic operations, land-use dynamics, spatio-temporal dimensions, and socio-ecological crises, has attracted less attention. Thus, this literature contends that it does not suffice to simply construe the non-urban 'outsides' as a constitutive part of city-building processes yet still as an 'obscure background to the study of contemporary urbanisation' (ibid.: 27). Accordingly, this perspective calls for a systematic rearticulation of the hinterland question in urban studies.

Inspired by these accounts, I seek to contribute to this rearticulation by zooming in on and unpacking the black box of contingent temporalities of water scarcity in Lusatia and the implications these contingent temporalities have for Berlin's future. I do so by broadly referring to contingency as a process of how 'things, spaces, and places could always be *otherwise*, but also *elsewhere* or *elsewhen*' (Landau-Donnelly and Pohl, 2023; 488; emphasis in original). With regard to the contingency of the hinterland, I am particularly intrigued by its ever supportive yet simultaneously unsettling function for urban life. AbdouMaliq Simone's account of 'negative potentiality' between the periphery and the centre is useful for the purpose of my endeavour. Simone finds that even though the periphery is instilled with a sense of insufficiency and incompletion, remaining dependent on the generosity and guidance of a centre, it is 'never really brought fully under the auspices of the logic and development trajectories that characterize a centre, and therefore embodies an instability that is always potentially destabilizing of that centre' (2007, 462). Consequently, concentrating on the contingency of the hinterland brings into view how these 'operational landscapes of planetary urbanisation' (Brenner and Katsikis, 2020) hardly provide stable footing for territorial development and, in the case of Berlin, ecological security. But, within the context of worsening ecological preconditions of water security in the region, this also exposes local territories and communities to increasing risk. To scrutinize how this contingency unfolds through time, next, I mobilize literatures on hydrological time and uncertainty in times of climate change.

Hydrological time and uncertainty

In the Lusatia Lake District, set to become Lusatia's post-mining landscape after centuries of coal extraction, all clocks have become obedient to the temporalities of water: Erratic rainfall, groundwater that is not rising at the anticipated speed, and the river Spree carrying less water than projected are all unsettling the region's hydrological balance. This hydrological time, determined by non-linear environmental changes rather than policy timelines with deadlines, forecasts, and fixed horizons, places a fundamental uncertainty at the heart of the linear long-term planning of the Lusatia Lake District. This situation burdens the hinterland with a double role, as it is unclear at what speed the post-mining lakes will be filled, but it is also uncertain how the hinterland will continue to supply Berlin with sufficient drinking water. Consequently, contingency not only destabilizes the temporal and epistemic scaffolding of future-making in the region but also embodies a sense of ambiguity, as decision-makers must steer towards an increasingly unclear future, where visions diverge, predictions are delayed, and responsibilities more and more fragmented.

Urban political ecology literature has been of immense value for outlining how water scarcity is socially produced by uncovering the intricate relations between social and natural worlds (Bakker, 2003; Heynen et al., 2006; Meehan, 2014; Loftus and March, 2019; Anwar et al., 2020; Millington and Scheba, 2021). Yet it has given less consideration to the role of time in the social production of water scarcity. To fill this gap, I draw on recent geographical and anthropological interventions on 'environmental time' in the context of climate change. These literatures have paid particular attention to the ambiguities climate change–related uncertainty holds. Evidently, climate change introduces unprecedented radical uncertainties, such as unforeseen disasters, erratic weather, or escalation in climate variation (Mehta et al., 2019). However, given the multifarious causes and consequences of these uncertainties, some may require no action at all (if considered to pose no risk for the time being), while others are deemed so risky they require immediate action at any cost, prompting community responses, activating emergency policies, and sometimes even pushing local communities towards illegal activities (Ahmed et al., 2019). Urban uncertainties are thus experienced and addressed differently depending on their causes and the actors involved. They may reflect the lived reality of the urban poor, a governance challenge, an economic opportunity, or a space for political engagement (Zeiderman et al., 2015), and they may relate to unpredictable futures or to obscured responsibilities for past climate degra-

dation (Ley, 2021). Related to water in particular, Zeke Baker, Julia Ekstrom, and Louise Bedsworth develop a theory of 'social temporalities' that weaves together the material environment of water management with analyses of the social practices of futurity (2018: 420). Similarly, Teresa Cavazos Cohn, Kate Berry, Kyle Powys Whyte, and Emma Norman take seriously the material environment for structuring temporal orientations of actions, exploring how spatio-temporal cycles mark the complexities of space and time in tribal water quality governance (2019).

Building on these works that address the junction between, in my case, hydrological time and the ways uncertain futures are enacted, I expand upon this literature to explore the multifarious ways actors mobilize 'time perceptions', i.e. different perceptions of time by social actors that have emerged in the climate emergency (Hanusch and Meisch, 2022). Doing so throws light onto the ambiguity that is inherent in the contingent temporalities of the hinterland. Next, I demonstrate how they play out in Lusatia.

Opening the black box of the hinterland: The Lusatia Lake District

To scrutinize the contingent temporalities in the planning for water scarcity in Berlin's hinterlands and the ambivalent time perceptions that emerge as a result, I first introduce the methodological basis of this chapter before presenting the background of the case. I build on qualitative case study research (Yin, 2014) conducted between 2023 and 2024. After an initial analysis of regional and urban development plans in Berlin and Lusatia, as well as newspaper articles, reports, and policy programmes, I then conducted and used data from 15 semi-structured interviews with infrastructure planners, regional planners, hydrologists, government officials from municipalities and the federal state of Brandenburg, former employees of the mining company, and environmental activists from organizations campaigning around the issue of water. The interviews lasted approximately 1.5 hours each and were conducted in person or via online video meetings. My analysis followed the principles of qualitative content analysis (Mayring, 2000).

In public discourse, Lusatia is often portrayed as a successful model of post-mining recultivation. The LLD carries weighty symbolic value regarding Germany's *Energiewende*, symbolizing the federal government's effort to phase out coal by 2038 as part of its Climate Action Act (Bundes-Klimaschutzgesetz, KSG) (Bundesregierung, 2024). Once an important energy centre of the former

GDR, the rural region in eastern Germany stretches across the federal states of Brandenburg and Saxony (Figure 1). Located about 1.5 hours by train south-east of Berlin, it covers an area of 13,000 square kilometres and is home to 23 lakes. Mining activity peaked during the GDR period, and it was during this time that the recultivation concept of transforming former mines into recreational lakes was conceived (Sullivan, 2016). After German reunification in 1990, control of the mines was transferred to the LMBV federal mining agency and to private companies. Since 2016, the Lusatia mines are owned by Czech investors, who now manage them under the LEAG Group.

Figure 1: Map showing Berlin, the river Spree, and the Brandenburg part of Lusatia.

Source: Linda Rauch.

Water scarcity as a 'temporal challenge'

In this section, I am concerned with the way in which the temporalities of water scarcity complicate this regional vision in the hinterland, the uncertainties that emerge from such temporalities, and the implications these uncertainties have for the future of Berlin's water supply. To make sense of this enigma, I specifically focus my analysis on one artificial lake, the Cottbuser Ostsee, a pertinent example for illustrating Lusatia's water-induced hinterland temporalities (Figure 2). Spanning 19 square kilometres, this lake is intended to be the centrepiece of a broader urban development project, which includes plans for a marina, residential neighbourhoods, sports and wellness facilities, a hotel, and commercial areas in the city of Cottbus (Cottbuser Ostsee, 2025b). A small city of approximately 100,000 inhabitants, it is situated near to the lake.

Figure 2: Cottbuser Ostsee before flooding was started in July 2019, showing a coal plant in the background.

Source: Leonhard Lenz CC 0 1.0.

Originally envisioned in a 2006 master plan, the development aims to establish a new tourist destination for the region. However, the timeline for the lake's usability remains uncertain. Although induced flooding began in 2019 and concluded in late 2024, it was repeatedly interrupted by four consecutive years of drought and high evaporation rates. These inconsistent water levels also triggered hazardous landslides along the shoreline. While exceptionally heavy rainfall in 2024 allowed the lake to reach its target water level of 62.5 meters, recurring droughts are expected to cause further fluctuations, raising increasing doubts about the project's long-term viability (Schibilsky, 2024).

But why is the temporal dimension so vital for understanding the logics of the hinterland? A joint statement by the federal states of Berlin, Brandenburg, and Sachsen published in 2022 to address growing concerns around the region's water shortage announces: 'The federal states are of the opinion that the adaptation of water management is a decisive element of the structural change process and that an earlier coal phase-out poses a particular temporal challenge' (Sächsische Staatskanzlei, 2022). Importantly, the statement's emphasis is on the 'temporal challenge' of water. This is because, on the one hand, the statement hypothetically cautions that a hypothetical 'premature coal phase-out' (referring to considerations by the federal government to exit coal even before 2038) will cause the expected water deficits to occur much earlier. On the other hand, the statement also underscores that 'between 15 and 20 years of planning and authorization time are missing for the proper clarification of water management issues. The investigations and measurements now have to be carried out in a much shorter time' (ibid.). Put simply, federal state decision makers stress that the predictive models and calculations of future water scarcity necessary for scenario building and water management concepts do not exist and that the time required to produce them is existentially delaying any solution that might be put into place. And why is that?

Contextualizing today's water scarcity historically

To fully grasp today's situation in the LLD, it is insightful to reflect on how cities in the former GDR were long characterized by an overcapacity of water infrastructures. Following reunification in 1990 and the abrupt transition of state socialism to a capitalist economy, a severe drop in consumption caused major problems for the technical functioning and viability of water infrastructure systems (Haug, 2004; Moss, 2008; Naumann and Bernt, 2009). This drop can be explained by the phenomenon of 'shrinking cities', which has character-

ized the post-socialist transformation of many former East German cities and regions, caused by depopulation and economic decline (Kabisch et al., 2010). Against this backdrop, water consumption in the new federal states and Berlin dropped by 41% between 1990 and 2004 (Moss, 2008).

Yet, these drastic socio-economic changes have led from a situation of overcapacity to one of scarcity. While plans for establishing the LLD originated in the era of overcapacity, today Lusatia constitutes one of Germany's driest regions, with a growing gap between declining supply of and rising demand for water due to the influx of new populations and growing industries that are being established as part of structural change policies, such as a new large railway depot, factories for electric batteries, and smaller tourism settlements (IHK, 2025). A local infrastructure planner describes how this change requires a complete reorientation in water management: 'The demands on water management are very different from what they used to be. In the past, we had to protect against flooding, […] now all we do is retention. That's a completely new approach that you have to get people's heads around first' (interview W04, 2023).[2]

The issue of water scarcity thus presents a growing concern among local communities in Lusatia (Radtke and David, 2024: 5). Initial scenarios project that during dry summer months this will entail up to 75% less water than 2023 in the river Spree (which both provides the Cottbuser Ostsee with fresh water and constitutes Berlin's main supply of drinking water) (Umweltbundesamt, 2023). This is owing to decades of mining and surplus water resulting from it, which was discharged into the river Spree, leading to an enormous groundwater deficit while simultaneously increasing the river's volume. The pumping of groundwater will gradually cease with the end of mining, eventually resulting in rising groundwater levels again – which is set to take decades. Thus, it is expected that water deficits in the region will not be countered by conservation alone (Umweltbundesamt, 2023).

Overall, the LLD has long symbolized Germany's sustainability transition. However, the region's shift from water overcapacity to scarcity is significantly undermining this vision, disrupting local development plans around the lakes. Debates over solutions remain contentious, as some reject the idea of

2 References have been anonymized to the following code: W = water. The abbreviation is followed by a number that lists the interviews chronologically, producing a unique code for each interview partner.

lake flooding entirely, while others advocate for large-scale infrastructure projects as a way forward.

The contingent temporalities of the hinterland

While it already seems distressing that the livelihoods of local communities are increasingly at risk in the face of uncertain future water supplies for the flooding of lakes, this situation becomes complicated by taking a closer look at the hinterland's entanglements with the city of Berlin.

Diverging visions

Within Berlin's 'Water Master Plan' (Masterplan Wasser) (Berlin, 2024), a chapter of considerable length is dedicated to highlighting the importance of improved multilevel governance, and particularly collaborations with the neighbouring state of Brandenburg in order to counter the looming water shortage. Essentially, this need is deduced from the need to collectively model water forecasts. However, the master plan is curiously illustrated with an image of this city-hinterland relation, portraying the river Spree as flowing flourishingly in Brandenburg's green and lush landscape, leading up to the city, which is set in grey tones in the background (Figure 3). This city-centric vision not only shows how the hinterland is suffused with the centre's imaginaries (Simone, 2007: 463) but also underlines the ideologies of nature underpinning urban sustainability policies (Wachsmuth and Angelo, 2018). In temporal terms, this vision suggests nature's infinite, endless supply of water in service of the city.

From this Berlin-centred perspective, it indeed seems unreasonable for Brandenburg to hold onto the vision of LLD, suggesting that peace would be restored if only it adjusts to this interpretation of their relations, letting go of the idea of the lake district in order to sustain a never-ending water supply for the capital, thus providing a stable footing for Berlin's ecological security. In this vein, the head of supply at Berlin's water operator questioned Brandenburg's decision to flood the mines entirely in a recent newspaper interview, highlighting the danger of furthering Berlin's water shortage through the huge evaporation surfaces the lakes offer (Rada, 2024).

Figure 3: Image in Berlin's 'Water Master Plan' depicting city-hinterland relations.

Source: Berlin 2024.

However, juxtaposed with the present situation at the Cottbuser Ostsee, where policymakers and local communities worry about the economic future after coal, due to the region's uncertain hydrological future (which puts into question the realization of the lake district), these same actors' future vision is associated with a seemingly finite time frame brought about by water scarcity. This finite time frame is expecting water to run out, calling for a decidedly different set of interventions, including the development of new large-scale infrastructure projects to transfer water from other catchment areas, as I will explore in a later section.

Contrasting these different time perceptions of endless and finite time frames in the diverging visions of the city and the hinterland thus testifies to a sense of ambiguity when it comes to foreseeing a future solution to the issue of water scarcity. This ambiguity asserts how the pursued stability of the hinterland (i.e. the flooding of the lakes for economic gains) is potentially

destabilizing for the centre (i.e. realizing the hinterland's vision of the lake district at the risk of increasing Berlin's water shortage).

Delayed predictions

To scrutinize the contingent temporalities of the hinterland that emerge from water scarcity and the implications these hold for Berlin, it is furthermore informative to uncover how these temporalities come into being through delayed predictive models, uncertain forecasts, and bifurcating time perceptions. As I have outlined previously, the biggest obstacle for ensuring safe and continuous water supplies for both Berlin and Lusatia are uncertain predictions on future water availability as well as unclear rises in demand. An initial study undertaken by the Federal Environment Agency (Umweltbundesamt) in 2023 projected that the drinking water supply in the greater Berlin area and in the river Spree is at risk of major shortages. The river may, in the future, carry up to 75% less water compared to the time of measurement in 2023; this will particularly be the case during dry summer months if, with the end of lignite mining, much less groundwater is pumped into the river than before (Umweltbundesamt, 2023). However, this constitutes a rough estimate, and the study concludes that an adequate data basis is still missing, calling for a sound data model to inform future decision-making. The agency's rather bleak forecast is regularly downplayed by the mining company, which has celebrated the complete flooding of the Cottbuser Ostsee in 2024 as a significant success (Cottbuser Ostsee, 2025a).

But why is measuring the looming water crisis so delayed, contested, and unclear? Many interviewees emphasize that the issue has simply been neglected for far too long. As one infrastructure planner put it, 'nobody was thinking about the issue of water. It is only now slowly getting attention in public debate' (interview W06, 2024). Additionally, and crucially, most of the necessary data is in private hands, namely with the mining company LEAG, rendering it difficult for public authorities to produce forecasts (RBB24, 2023). The federal states of Berlin and Brandenburg are currently developing a joint water scarcity strategy, set to be announced in 2025 (Staatskanzlei Brandenburg, 2023). This is meant to provide a data basis for measures to counter water scarcity, such as a transfer pipeline for water from the river Elbe. Additionally, Brandenburg and Saxony are collaborating with the federal government to create a groundwater model by 2027, which will inform future decision-making (Brandenburg, 2024).

However, this unclear data situation gives rise to bifurcating interpretations and time perceptions in the hinterland. Concerned about the flooding of lakes and its consequences for the tourism sector, municipalities in the region have issued a joint statement in response to the Environment Agency's report, declaring that 'further delays in fundamental decisions must be avoided at all costs' (Lausitzrunde, 2023). Considering the relevance of water for new industries, a representative of the local Chamber of Commerce in Cottbus seconds that, adding that new industries 'are increasingly aware of the issue and checking water availabilities on commercial sites before deciding to locate' to Lusatia (interview W14, 2024). However, he stresses that, as of now,

> it's all a forecast, and as we know, forecasts are sometimes uncertain. […] This lack of data is a real concern for companies […] This uncertainty, I think, is relatively high. Hmm. And then, um, how do you currently [i.e. without a data basis] guarantee water supply for industries and commercial locations? (ibid.)

Companies, too, perceive governmental action on dealing with the issue as not fast enough, slowed down by a data collection process that should have been carried out years ago, and thus call for more immediate action and the development of public water management concepts to solve the water crisis (interview W14, 2024). Similarly, a civil servant of Brandenburg's Ministry of the Environment (MLEUV) in charge of hydrology underlines the uncertainty of the situation but defends the fact that it is taking years to develop water models, warning that the uncertain situation could be instrumentalized by different actors:

> But the problem is that many things are unclear. And because they are unclear, they are or can be used by different camps to fuel or support their own interests. And that always makes it difficult. So, if you have a good data basis on which you can build reliable statements, that's always the best thing, and that's what we're working on right now. (Interview W05, 2023)

The way these actors address this uncertainty differently makes for fragmented responsibilities with ambivalent consequences, as I will explore below.

Fragmented responsibilities

Against this backdrop of diverging visions and delayed predictions, environmental activists argue that the vision for the LLD is no longer certain, and they are actively campaigning to halt current plans to fill the lakes (Schuster, 2022: 10). In contrast, government authorities, and particularly the state of Brandenburg, continue to support the vision, with several initiatives underway to address water scarcity. The key study by the Federal Environment Agency, already mentioned, recommends upgrading dams and water reservoirs, as well as expanding existing artificial lakes to serve as water basins (Umweltbundesamt, 2023). Moreover, among its more contentious proposals is the idea of transferring water from other catchment areas, such as the river Elbe. Several of my interview partners, including federal states and the mining company, considered this 'Elbe pipeline' the most promising solution, though it would require years of legislative approval and construction. But planning authorities are hesitant, awaiting the predictions of water models currently being developed.

However, these speculative solutions that are currently on the table also give rise to contingent temporalities, unfolding through actors' varied time perceptions between acceleration and hesitation. An alliance of environmental NGOs calls for 'accelerated planning so we can get started' to tackle the region's water crisis and views its role as 'constantly pushing' public authorities to quickly implement solutions (interview W07, 2024). They favour investments in new big infrastructure through water pipelines from the river Elbe. Crucially, the alliance claims that the delay in decision-making is due to failed governance between regional and national governments and the mining company, stating that those actors have long wasted time as 'nobody felt responsible' for this task that would 'take years or decades and cost an incredible amount of money' (interview W07, 2024). Curiously, the mining company is now benefitting from this sense of urgency, which it uses to heavily advocate for building the proposed pipeline to channel water from the river Elbe (interview W04, 2023). Publicly financed, this major infrastructure project would provide an inexpensive solution and 'way out' of the company's responsibility to provide financial resources for recultivating the mining landscape, as interviewees explained (interview W01 2023; interview W06, 2024).

Agreeing with this narrative of acceleration thus risks skewing decision-making towards the mining company's own economic rationales. Crucially, this goes back to a law – Section 55 of the German Federal Mining Act (Bundesberggesetz, BBergG) – that obliges companies operating open-cast mines

to pay for the costs of recultivation following depletion, following the so-called 'polluter pays principle'. Yet, how this law is implemented in practice remains highly dubious: Mining companies themselves are responsible for estimating the future follow-up costs for recultivating depleted mines, and publicly reconstructing these costs remains difficult (Oei et al., 2017). The pipeline is justified as a forward-thinking technological success story, although this narrative leaves out environmentally destructive consequences that might emerge from it or elsewhere.

Due to these dynamics, the infrastructure planners I interviewed call for slowing down, fearing the pipeline would be too quick a fix to a complex hydrosocial problem requiring much more holistic thinking. A local water infrastructure planner states that the discussions around solving the water crisis in LLD is too human-centred, believing that 'everything can be bent to our technical needs, like flying to the moon' (interview W06, 2024). Correspondingly, someone else declares 'yes, many people prefer the technical solution. And in this respect, the transfer is certainly the more convenient solution. But in the long run, you have to ask yourself whether it is the better solution' (interview W15, 2024). In a conversation I had with Berlin's water planners, their perspective sides with critics of the pipeline project, but they also did not want to make definitive statements until presented with the results of the groundwater models expected in the coming years.

Fragile city-hinterland futures

To conclude, I have argued that Berlin's looming water crisis cannot be fully understood without looking beyond the city limits. Berlin's future water supply is tightly entangled with the city's hinterland, Lusatia, which is currently undergoing profound structural change due to the coal exit, resulting in the transformation of former coal mines into the Lusatia Lake District and the concomitant development of new industries and economic developments. Zooming in on this hinterland, I have laid out how water scarcity is socially produced, complicating these plans, bringing uncertainty not only to Berlin's future water supplies but also to the LLD's future.

Engaging with literatures on the contingency of hinterlands and water as a temporal factor, I have attempted to throw light onto this enigma by tracing the contingent temporalities of the hinterland and their plural time perceptions by different actors, thus stressing how the specific rhythms of the hinterland are

shaped by ever-changing, situational, and often uncertain conditions. These contingent temporalities unfold, first, through diverging visions between the city and the hinterland, whereby the city envisions the role of the hinterland to be the provider of endless flows of drinking water and the hinterland is more concerned with the immediate threat of not enough water for realizing its vision of the LLD (for a more extended analysis of why the region is holding onto these 'futures of the past', see Nettelbladt, forthcoming). Second, contingent temporalities come into being through delayed predictions, indicating that the extent of the situation is not yet predictable, due to a socially constructed lack of data, which is the result of the non-existence of models and of the ineffective public-private interface with regard to data availability. This lack creates uncertainty that is addressed in a variety of ways, according to each actor's specific interests. Thus, and third, I have shown how this gives rise to a variety of speculative solutions to the problem at hand (most notably a water transfer from the river Elbe), and to the creation of facts (as lakes are filled up before it is clear whether this is a sustainable and environmentally just solution). These different approaches are equally rooted in contingent temporalities, unfolding through actors' varied perceptions of time, between acceleration and hesitation, ultimately demonstrating how this leads to fragmented responsibilities and claim-making between city, regional, and national governments, environmental activists, and the mining company.

These findings point to a fragile and increasingly untenable foundation for Berlin's water future, one that continues to rely on a hinterland that is undergoing deep environmental and socio-economic transformation. As Lusatia navigates the uncertainties of its post-mining trajectory and confronts its own water scarcity, Berlin's expectation of steady, extractable flows appears misaligned with Lusatia's increasing uncertainty. The temporal dissonances and competing visions between city and hinterland expose how this fragile future is marked by a fundamental ambiguity: The pursuit of stability in the hinterland, most notably through the rapid flooding of lakes to spur economic gains, potentially undermines water security in the centre. In other words, efforts to stabilize the periphery may actively destabilize Berlin.

At the same time, the hinterland itself is shaped by plural, and often conflicting, development logics that appear ill-equipped to respond to the rapidly changing environmental situation. Visions of economic revitalization through lake tourism and new industries continue to follow linear, future-oriented planning trajectories that presume the availability of water as a stable and manageable resource. This reveals a troubling disconnect between

long-standing imaginaries of regional transformation and the unpredictable hydrosocial realities now unfolding. Rather than recalibrating in the face of growing uncertainty, authorities in the hinterland seem to double down on speculative promises of progress, creating facts through premature flooding and postponing necessary structural adjustments. Time will tell if this leads to further inertia.

What we can learn from the case of Berlin is that accounting for the 'contingent temporalities of the hinterland' is thus vital for opening its 'black box'. Doing so offers a promising entry point for rearticulating the hinterland question in the 21st-century context of looming environmental breakdown (Brenner and Katsikis, 2020) through highlighting its intrinsic temporal dimensions. Grappling with the ever 'negative potentiality' of the hinterland (Simone, 2007) through emphasizing hydrological time reveals a productive focus that has thus far been neglected in urban studies but appears to be an indispensable task as cities around the globe face a growing climate change–induced 'tragedy of water' (GCEW, 2023), resulting in existential hydrological challenges for human and non-human environments alike. Not relegating the hinterland to the 'obscure background' of contemporary urbanization (Brenner and Katsikis, 2020: 27) is of utmost importance in this endeavour. A truly holistic effort in responding to water scarcity in cities must take seriously its interdependent relationship with those non-city spaces sustaining it across administrative boundaries but must also bring the contingent temporalities of the hinterland centre stage. This will, at first, expose the fragility of city-hinterland futures but potentially also open up possibilities for reimagining their contingent waters in more equitable and environmentally just ways.

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Appendix

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